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PHYSICIAN SUPPLY, PEER REVIEW AND USE OF HEALTH SERVICES IN MEDICAID

John Holahan

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I. Introduction

This paper will present the results of an empirical investigation of the use of selected health care services in the California Medicaid Program during 1969 and 1970. Four principal issues of interest to public policy are addressed. First, what is the impact of different levels of resource availability (e.g., physicians, hospital beds, etc.) on utilization of various health care services by low income individuals when those services are provided at no cost to the user? In addition, what is the impact of different levels of availability of general practitioners on numbers of physician visits or diagnostic services and surgeons on surgery rates? Second, what net effect on utilization did the San Joaquin Foundation, prepaid on capitalization basis by the state, have on utilization rates for various services? Third, are there differences in utilization rates among blacks, Spanish-surnamed families, and whites in the Medicaid program in California? Fourth, are there differences in utilization rates between residents of urban and rural areas?

The health care system in this country is characterized by a critical maldistribution of resources and an allegedly inefficient delivery system. The former has led to concern about underutilization of services where providers are scarce and overutilization where they are in abundance. It is argued that the lack of facilities and practitioners in rural areas and urban ghettos leads to delays in seeking care, difficulties in obtaining appointments, long waiting lines, etc., and as a result, lower utilization rates. Concern has led to discussion of incentive schemes for influencing

location decisions of private providers and of the necessity of public provision of medical services.

On the other hand, it is argued that the presence of relatively high ratios of hospital beds to population in certain areas results in an excessive number of admissions and longer stays. Several health experts have proposed that limitations be placed on the construction of hospital beds in order to control hospital utilization. Certificate of need legislation has been implemented in several states in response to the problem.

More recently, some economists have suggested that similar problems occur when physicians are relatively abundant. Unlike most service providers, physicians have an unusual degree of influence over the users of their services. In the typical economic market, an excess supply of a given service will lead to some market clearing solution at lower prices, with corresponding reductions in provider incomes. In the market for physician services, the result can be and often is increased service provision and higher prices with little or no loss in physician incomes.

Evans had made the following comment on "traditional" models of the market for physician services:

What is neglected, however, is the theoretical significance of the other aspect of the physician's role, the patient's agent. The physician can exert direct influence on the demand function of the consumer by altering the patient's perceptions of his needs and of the capacity of medical technology to satisfy them. Thus, the medical service market cannot be simply dichotomized into demand side and supply side, with price serving as the only nexus between the two; rather we must allow for shifts in the demand curve itself in response to supplier behavior. Market clearing may take place directly through the information which suppliers pass to consumers as well as by adjustments in price.

In such a market, it may no longer be taken for granted that conventional economic propositions hold. If, for example, physicians respond to increase in price by exerting a stronger positive influence on patient's perceptions of their "need" for

service, then it is not impossible for the total response of quantity demanded to price to be positive. The partial response may be negative as consumer theory predicts, but the ceteris do not remain paribus. Instead they vary in a systematic way with price.

Similarly an increase in the physician stock, if physicians have discretionary power over demand, may lead to increases in both output and prices. This is because the power to sell at the current price (by increasing each consumer's demand) is equivalent to the power to sell the current output at a higher price (by increasing demand and simultaneously raising price). An increase in number of suppliers at a given volume demand and price will lead to a fall in each supplier's income; he can respond to this change by expanding his effort on demand generation and then either working more or raising prices, or both. 1/

The presence of physician-induced demand does not imply that there are no medical benefits from the care delivered when physicians are in abundance. Indeed, it is impossible for economic analysis to render such judgments. The economist can only argue that there is a cost to additional services and that at some point the value of more services becomes negligible relative to alternative uses of resources. In his discussion of health manpower issues, Reinhardt observed:

In postulating the likelihood of physician-induced increases in the demand for their services, one need not really appeal to baser economic motives: the application of medical science to human illness is a sufficiently imprecise enterprise to permit great leeway in practice patterns even on purely medical grounds. After all, a good part of medical practice involves decision making on the basis of empirical information concerning the patient's health status, and it can rightly be held that the more information the better. Since both patients and physicians are conditioned to view the resource intensity of medical treatment as an important index of its quality, it is only reasonable to assume that, where physicians are in ample supply, even marginally beneficial diagnostic or therapeutic procedures will be performed, and that the normal physician-patient encounter will be

1. Robert D. Evans, "Supplier-Induced Demand: Some Empirical Evidence and Implications," in Mark Perlman (ed.), The Economics of Health and Medical Care (New York: Halstead Press, 1974), pp. 163-164.

lengthened to absorb the available physician time. This development is even more probable when patients are covered by health insurance and do not directly or indirectly bear the full cost of their treatment. In short, there is no reason to suppose that medical practice is immune from Parkinson's Law. 2/

Despite the general interest in physician-induced demand and the current general agreement that demand equations for physician services which omit physician availability variables are mis-specified, there has been relatively little detailed empirical support for the proposition.

In general, it is difficult to observe the impact of supply factors on utilization because of the high correlation of those factors with income and insurance coverage. The Medicaid program in California allows us to study the influence of these supply factors because other variables are held constant. For example, all major health services are completely covered by the program at no cost to users (during the period studied) and the entire population can be considered a low-income group. Furthermore, incentives facing providers are uniform because the study is limited to a single state in which the reimbursement arrangements are uniform.

In this paper, attention was first focused on the effect of different levels of physician availability on rates of utilization of various services. Will increases in the supply of physicians affect the utilization of services by the poor? Will impacts of physician supply increases be different in urban and rural areas? Which services are most sensitive to physician availability: visits, diagnostic services, surgery, prescription drugs? Will increases in the supply of physicians increase or reduce the provision of care in inpatient

2. Uwe Reinhardt, Physician Productivity and the Demand for Health Manpower (Cambridge, Mass.: Ballinger Publishing Co., 1975), pp. 9-10.

settings? Are there differences between utilization measures which tend to be patient controlled (e.g., the number of eligibles with one or more visits) vs. those where there is a large measure of physician influence (e.g., lab tests, prescription drugs, hospital admissions)? Will an increase in the supply of private office-based physicians reduce the use of services in hospital outpatient settings? Does the distribution of physician between general practice and specialization affect utilization rates?

We also examined the hypothesis that inpatient admissions reflect the availability of beds. It is often asserted that because providers are able to influence and often control the demand for services they will increase the demand for inpatient care rather than permit occupancy rates to fall. We also examined the effect of the distribution of hospitals between public and private facilities. We argue that while the choice of public facility was more likely the higher the ratio of public to private beds, total utilization would be lower because public sector hospitals have less reason to be concerned with the fiscal implications of low occupancy rates.

The health care system has also been characterized by inefficiency in the delivery system. It has been argued that fee-for-service solo practice medicine has resulted in too little concern with the efficient delivery of services. Because the physician's income varies directly with the number of (and complexity of) services rendered, the physician has a strong incentive to provide people with more services than "necessary." Concern with alternative reimbursement arrangements has led to considerable interest in two different delivery modes: health maintenance organizations (HMOs) and medical society foundations. A rather large literature on HMOs has developed in the past

decade. However, little empirical investigation of the impact of foundations has been undertaken.³

Medical society foundations are characterized by the following: the foundation is prepaid on a capitation basis, the providers for the foundation are independent private practitioners, and the physicians are paid on a fee-for-service review. Foundations are considered an HMO prototype in legislation now before Congress. However, there are important differences between large group practice HMOs and foundations. Because of pre-payment, group practice HMOs are provided incentives (1) to limit the use of unnecessary services and (2) to minimize the cost of service provision. The efficiencies generated by foundations will be derived primarily from the former. Because individual practitioners are reimbursed on a fee-for-service basis, they do not face the

3. One previous study has examined the impact of the San Joaquin Foundation on aggregate utilization rates. That study (Foline E. Gartside, "The Utilization and Costs of Services in the San Joaquin Prepayment Project," Univ. of California, Los Angeles, 1971) compared the utilization experience in San Joaquin county with that of Ventura county in the first six months of the prepayment project, February 1968-July 1969. Ventura county was chosen because it has comparable population size, percentage of the labor force in agriculture, household income, and population ratios of hospital beds and physicians. The study found lower utilization rates (as measured by costs per eligible person) in San Joaquin for most services. An examination of only the AFDC population yielded similar conclusions. The study reported average monthly cost of \$17.44 per eligible person in Ventura County vs. \$14.80 in the San Joaquin counties. The difference in physician services were \$5.87 vs. \$5.20 in Ventura and the San Joaquin county group. Unfortunately the analysis was complicated by several factors. First, individuals eligible for both full and part year were used in the comparison. Preliminary tabulations prepared early in the present study showed markedly higher utilizations rates for most services for part year eligibles. The Gartside study notes that Ventura county had higher turnover rates--a higher ratio of part year to full year eligibles. Second, the study combined all four counties in the San Joaquin project--San Joaquin, Amador, Calaveras and Tuolumne. The latter three are low density, heavily rural counties and it may not have been appropriate to include them. Third, the study contained no statistical control for other factors such as the racial, or ethnic composition of the population and did not adequately control for the age and sex composition of the population. Finally, no tests of statistical significance were reported.

same incentives as the more traditional group practice HMO to use the most efficient combination of inputs or to operate at the optimal scale. Rather, the foundations attempt to assure that the costs of service delivery are below a predetermined budget level through extensive review of provider claims. While there are reasons to believe foundations will not be as efficient as traditional health maintenance organizations, they are probably more acceptable to a greater number of physicians in this country. Thus, it is possible that they will experience a faster growth rate than group practice HMOs and may soon become the dominant alternative to the traditional fee-for-service solo-practice form of delivery.

During fiscal year 1969 and 1970, the San Joaquin Foundation was "at risk" under the Medi-Cal program for all physicians services--visits, diagnostic services and surgery. The Foundation was not at risk for services rendered in a hospital--inpatient or outpatient--unless the foundation was billed by a private physician for those services. Therefore, the Foundation was not at risk for hospital charges themselves. It was also not at risk for prescription drugs at that time. Data from the California Medicaid paid claims system will permit us to estimate the net impact of the San Joaquin project on utilization rates for several services, including those for which the Foundation was at risk.

The net impact is important because the fiscal intermediary (Blue Shield) which reviews claims in other counties also attempts to control unnecessary utilization. While it is not itself at risk, Blue Shield is legally required to systematically examine claims to determine that both providers and beneficiaries are eligible to participate in the program and that the service provided is a covered benefit and medically necessary or appropriate. It also presumably had some need to be concerned with the state's assessment of its

performance because of the presence of other insurance firms which could perform the intermediary function. The foundation model, if it is to replace insurance firms by providing a closer link between the insurance and provider function, must show evidence that it can monitor the delivery of care in a more effective fashion than those available alternatives. This study has had as its primary focus the impact of foundations on utilization. Foundations could be viewed as desirable if their review process results in a higher level of care quality. The effect of peer review on quality of care was beyond the scope of this study.

Our third concern was with differentials between residents of urban and rural counties. The physician-population ratio is not, in itself, a sufficient measure of availability. Counties with identical physician-population ratios might be quite different in the dispersion of their populations. As a result, differences in utilization between urban and rural residents will remain even after control for physician availability. Remaining differentials in utilization rates may be due to differences in morbidity or in attitudes toward medical care, or may be attributable to the inaccessibility of providers. Utilization differentials not attributable to differences in physician availability might suggest that specific supply policies need to be undertaken if the objective of equal access is to be obtained.

We were also interested in examining differentials between whites and non-whites and between whites and Spanish-surnamed eligibles. It has been argued that despite complete financial coverage, the private sector delivery mechanism is not responsive to the needs of particular demographic groups. Differences in utilization between whites and other groups will remain because of racial discrimination by providers or because of lack of access to

medical care providers who are primarily located in other non-white areas.

Utilization differentials would once again suggest that specific supply policies are necessary if equal access is to be achieved.

II. Selected Hypotheses

The basic model used in this paper is fairly comparable for all services. We argue that utilization rates for health services in Medicaid depend on the availability of physicians, the specialty composition of physicians, the racial and ethnic composition of the population, the extent of local support for the Medicaid program as well as the age and sex composition of the population. As discussed below, many of these variables will be hypothesized to operate in different directions for different services. We also argue that certain variables, in particular the physician supply variables, will operate differently in urban and rural counties. As a result, separate equations are estimated for urban and rural counties. The basic equation is then as follows:

$$U_{ij} = a_0 + a_1 \text{POV}_j + a_2 \text{ODOCS}_j + a_3 \text{ODOCS}_j^2 + a_4 \text{GP}_j + \\ a_5 \text{BLACK}_j + a_6 \text{SPAN}_j + a_7 \text{SJ} + a_8 \text{MALE-II} + \\ a_9 \text{FEM-I} + a_{10} \text{FEM-II}$$

where

U_{ij} = alternative measures of utilization, e.g., the ratio of users to all eligibles, services per user, cost per user, services per eligible and cost per eligible, for group i in county j

POV_j = the ratio of families on public assistance to families below the Census poverty line in county j

ODOCS_j = the ratio of office-based physicians to population in county j

ODOCS_j^2 = the square of the ratio of office-based physicians to population in county j

SPEC_j = the proportion of physicians who are specialists in county j

BLACK_j = the proportion of the public assistance population that is black in county j

SPAN_j = the proportion of the public assistance population that is Spanish-surnamed in county j

URBAN = a dummy variable equal to one if an urban county and zero if a rural county

SJ = a dummy variable equal to one for all San Joaquin county observations and zero otherwise

MALE-II = a dummy variable equal to one if utilization rate pertains to a male group, ages 16-44

FEM-I = a dummy variable equal to one if the utilization rate pertains to a female group, age 0-15

FEM-II = a dummy variable equal to one if the utilization rate pertains to a female group, ages 16-44

There are a number of exceptions to this formulation. In the hospital inpatient equations, the ratio of hospital beds to population and the ratio of public beds to total beds are employed. In general, a quadratic form for the physician supply variable is used on the assumption that the influence of larger supplies of physicians on utilization is positive but declining. We hypothesize that the marginal impact of larger physician supplies is negligible beyond some level of physician supply. In counties such as San Francisco, Santa Clara and Los Angeles, where there are high physician-population ratios, a form of saturation occurs. The square of the physician-population rates should capture this effect. In only one instance, hospital inpatient care in rural counties, did the linear measure of the variable perform better than the quadratic expression.⁴

In the surgery equations, the surgeon population ratio and its square were substituted for the physician supply variables. In the hospital inpatient and

4. The bed and physician availability variables are considered exogenous in each set of equations because Medicaid eligibles are a very small segment of the total demand for services. The demand for Medicaid eligibles for services and the prices set by state authorities can be assumed not to affect the availability variables; rather, the direction of causation is presumed to run from supply to utilization.

prescription drug equations, all active non-federal physicians were used instead of office based physicians on the grounds that all physicians generate demand for those services.

A. Physician Supply

A major objective of this paper has been to analyze the effect of physician supply on utilization, and to the extent possible, assess whether positive impacts on utilization result from increased access of the poor to physician's care or from demand creation by physicians. There is an increasing level of concern that the greater utilization levels that come with a larger supply of physicians may represent a use of scarce resources which is less valuable than alternatives. That is, as the supply of physicians increases, less severe medical needs receive attention, tests which add only marginal amounts of information are performed, and so on. Some would argue that positive harm can result from excessive medical care, particularly surgery. A paper of this sort is clearly unable to make assertions about appropriateness of medical treatments. We have been able to investigate the responsiveness of a variety of utilization measures for six different services to changes in physician supply. Some tend more to measure access while others tend to support inferences of demand creation.

We first hypothesized that the availability of physicians would be positively related to the number of physician visits. As the ratio of office-based physicians to population increases, one would expect that fewer Medicaid eligibles will be denied services because of difficulty in obtaining appointments, lengthy queues, etc. Implicit prices of medical care consumption such as time, transportation and search should be inversely related to the physician population ratio. In addition, an increased number of services will be

received by those who see physicians. Because of the considerable consumer ignorance with respect to the appropriateness of specific medical services, the patient defers many utilization decisions to the physician. Feldstein, Evans and others have suggested that the physician acts as an agent for the patient in his decisions on appropriate service utilization, but because this agency relationship is incomplete (the physician's objectives do not always coincide with those of the patient), the physicians utilization recommendations will frequently result in a shift in the demand curve. Supply is typically thought of as affecting demand only through its influence on price. However, because the physician is able to shift the demand curve, the demand for services can be increased or decreased at constant prices. The propensity of physicians to shift the demand curve will depend in part on the relative availability of physicians. That is, an excess supply of physicians will lead to a provider-induced increase in demand rather than a fall in price. Likewise, an excess demand for physician services will call forth provider-induced reductions in demand rather than price increases. The influence of physicians on patient decisions should appear in the visits and costs per user equations, while the ratio of users to eligible persons will almost completely reflect patient decisions to seek care.

Physician availability can affect hospital bed utilization in two contradictory ways. First, it can increase access to ambulatory care which in turn results in discovery of conditions requiring hospitalization. The propensity for physician-induced demand to increase as physician supply increases applies to care rendered by office-based physicians in inpatient settings as well. On the other hand, increased physician availability can result in substitution of care in physicians offices for care in an inpatient setting. Particularly in areas where physicians are in very short supply,

inpatient utilization rates may be higher as more patients are hospitalized for diagnostic work or for observation by hospital staff.

The availability of physicians should be positively related to the number of diagnostic services provided. Diagnostic services are a segment of medical care where decisions are particularly likely to be left up to the physician rather than being exogenously determined. Once again, we expect the propensity of physicians to shift the demand curve for their services to depend in part on the relative availability of physicians. That is, an abundance of physicians will lead to provider-induced increases in demand while a relative shortage of physicians will result in significantly less demand for diagnostic services.

In the surgery equations, we were primarily concerned with the impact of different levels of availability of surgeons on surgery rates. There is general interest in whether and to what extent surgery rates vary between areas with relatively few surgeons and areas with large numbers of surgeons per capita. In California, the surgeon population ratio varies from 3.4 to 14.2 per 10,000 people in urban counties and from 1.9 to 5.7 in rural counties. We hypothesized that surgery rates would increase with the availability of surgeons and expected this effect to be particularly strong in urban areas. Evidence that surgery rates increase with the availability of surgeons is not evidence that unnecessary surgery is performed. As an alternative one could argue that many unmet needs of the poor are taken care of as surgeons become more plentiful.

In the next section, we examined the relationship between the amount of drug prescribing and the availability of physicians. It has been asserted by some experts that physicians frequently overprescribe drugs where time is

limited. In testimony before a House Subcommittee in 1972, Dr. Charlotte Muller has stated:

[T]he typical physician can spend an average of only 17 minutes with each patient. At the end of that time, even though a patient's problem may not be completely discussed, understood or solved, it is necessary for the physician to turn his attention to the problems of the next patient who is sitting in the waiting room. But the physician must first get rid of the patient then in his office, and in a manner which will make all parties comfortable. Prescribing is, theoretically at least, a means of terminating the interview in a fashion that satisfied both doctor and patient. The prescription is a signal for the approaching end to the encounter, it both summarizes and carries forward the relationship, it is an expression of concern, and it deals with the interests of both parties in a manner perceived as equitable. 5/

One hypothesis which follows from this argument is that drug prescription rates will be high where physicians are in short supply, other things being equal. Drug prescription rates will be inversely related to the time available per patient. An alternative hypothesis is that prescription drug rates will increase with the availability of physicians; if more abundant supplies of physicians lead to more physician visits, higher drug prescription rates are likely to follow.

In the hospital outpatient care equations, our principal concern was with investigating the extent to which outpatient services substitute for care by private physicians. Outpatient services are generally considered less desirable because the quality of care is allegedly inferior to that offered by physicians in private practice. There is a lack of personal and continuous contact with a physician, appointments are not normally available, and waiting time is longer. Thus we expected the outpatient service variables to be negatively related to the availability of private physicians.

5. Hearing before the Subcommittee on Monopoly of the Select Committee on Small Business, Part 3, December 5-14, 1972.

B. Physician Speciality Composition

For all services other than surgery, we employed a variable to control for the distribution of physicians between general practice and specialties. In the hospital inpatient equations, the ratio of specialists to all physicians was employed to control for the influence of the availability of medical and surgical specialists, on hospital admissions, length of stay, costs, etc. Care by specialists is more sophisticated and expensive and frequently requires an inpatient setting. Thus, admissions rates and costs per eligible person should be higher, the greater the availability of specialists.

We used the ratio of private general practitioners to all private physicians to examine the effect of the relative availability of general practitioners on use of physician services by Medicaid eligibles. It is generally believed that general practitioners play an important role in care for the poor. General practitioners work somewhat longer hours and see more patients than other physicians, including internists and pediatricians. We expected the number of eligibles seeing private physicians to increase with the availability of general practitioners and the number of services and costs per user to fall. The number of services and costs per user should fall if general practitioners provide fewer and less costly follow-up visits. If general practitioners tend to hospitalize fewer patients than specialists, they should also generate fewer in-hospital visits.

The ratio of private general practitioners to private physicians was used to examine the effect of the relative availability of general practitioners on use of diagnostic services. While general practitioners appear to have an important role in care for the poor, they are allegedly less

likely than medical specialists to use diagnostic services. Thus, we expected the percentage of eligibles receiving diagnostic services to be lower, the greater the ratio of general practitioners to physicians. In general, we expected the other utilization variables to follow the same pattern.

We argued earlier that prescription drug rates should be positively related to physician visits and inversely related to the time available per patient. If this argument holds, prescription drug rates should be higher where a greater proportion of physicians are general practitioners. General practitioners see many more patients than specialists with only a small increase in hours worked. Thus, general practitioners may be more likely to prescribe drugs for both reasons (1) they see more patients and (2) they spend less time per patient.

Finally, in the hospital outpatient equations, we included the ratio of general practitioners to physicians to test the hypothesis that outpatient care will substitute for care by general practitioners by providing the general medical services required by families.

C. Hospital Bed Supply

The ratio of acute care hospital beds to population was used to test the hypothesis that increased bed supply leads directly to hospital bed utilization. Rather than permit occupancy rates to fall, it is alleged that hospitals encourage physicians to increase admission and lengths of stay. Thus, occupancy rates stay roughly constant and bed utilization varies with bed availability. The only apparent constraint on the ability of suppliers to manipulate demand is the sharing of costs by patients. In the past decade, increased insurance coverage has significantly reduced the share of costs of hospitalization generally faced by patients. Because Medicaid

eligibles bear no out of pocket costs for any form of care, one would not expect them to be resistant to provision of care which is discretionary and/or perhaps excessive. On the other hand, Medicaid payment levels, claims processing, and utilization review requirements may discourage hospitals from providing discretionary services to Medicaid eligibles.

The ratio of public beds to total beds was used to test the hypothesis that bed utilization will be greater, the smaller the share of available beds that are in the public sector. While the choice of a public rather than private facility is probably more likely the higher the ratio of public beds to total beds, total bed utilization is likely to be negatively related to that ratio. The argument that bed supply leads to bed utilization rests in part on the fact that low occupancy rates result in budget deficits which inhibits bed and equipment expansion and quality and amenity increases. Public hospitals have less reason to be concerned with budget deficits and appear to be more willing to permit occupancy rates to fall. Thus, we expect bed utilization rates of Medicaid eligibles to be negatively related to the share of available beds in the public sector.

D. The Racial and Ethnic Composition of the Eligible Population

We used the percentage of Medicaid eligibles who were black and the percentage who were Spanish-surnamed to investigate the presence of differentials in hospital use between these two groups and Medicaid eligible whites. We expected that these two groups would have less access to hospital care and that utilization rates would be lower.

In the physician service and laboratory, x-ray, and other diagnostic services equations, we used the same variables to test the hypothesis that non-financial barriers to care are more severe for these two groups than for

non-Spanish-surnamed whites. In the surgery equations, the same variables were used to test the hypothesis that these two groups have less access to surgical specialists than low income whites.

Next, we tested for differentials in use of prescription drugs between blacks and whites and Spanish-surnamed individuals and whites. If, as suggested above, blacks and spanish-surnamed individuals have less access to physicians than whites, they may in turn have lower drug prescription rates. On the other hand, lower physician visit rates may indicate that both groups tend to delay seeing physicians until more serious conditions develop and may require greater remedial use of drugs as a result.

Finally, we investigated the presence of differentials in use of outpatient care between blacks and Spanish-surnamed individuals and whites. If both groups systematically have less access to private physicians than whites, then greater use by these groups of outpatient services may result.

E. The San Joaquin Prepayment Experiment

We examined the impact of the San Joaquin Foundation on use of all services. The Foundation was at risk for physician services, all diagnostic services performed in an ambulatory setting and surgery. It was not at risk for hospital inpatient care, hospital outpatient services, and prescription drugs. It is frequently alleged that peer review could yield savings by reducing the number of less necessary or unnecessary follow-up visits, diagnostic services and surgery. The impact of the San Joaquin Foundation is examined by using a dummy variable for the San Joaquin county observations. This will provide a test of whether utilization rates would be significantly different than they would have been in the absence of the utilization review program. San Joaquin was not at risk for prescription drugs but did exercise

some review over drug claims. Thus, one would expect prescription drug rates to be lower if excessive drug prescribing was being effectively controlled. Prescription drug rates might also be lower if physician visit rates are reduced.

Finally, we tested for a differential in use of hospital inpatient and outpatient services in San Joaquin county. While San Joaquin was not at risk for these services, utilization rates for each are likely to be affected. For example, the influence of peer review on physician services should also be felt on care rendered in inpatient settings. Alternatively, one might argue that more services will be provided in hospital settings by hospital staff personnel as private physicians seek to limit the number of services they provide.

Outpatient care is also likely to be affected. If the Foundation increased the access of the poor to care by private physicians, hospital outpatient care should fall. Alternatively, if the claims review process results in patients often being denied services they believe desirable or in more frequent referrals to hospitals for diagnostic services, greater use of outpatient care may result.

III. Data

This study has made use of data from the Medicaid paid claims system provided by the California Department of Health Care Services. The data consists of all medical services utilization by a two percent sample of all Medicaid eligibles during fiscal years 1969 and 1970. The two percent medical history sample is a systematically selected simple random sample of two percent of the cases from the file of all cases eligible for assistance under the Medi-Cal program at any time during the year. Once a case is selected from the eligibility records, all claims paid on behalf of the case are taken from the paid claims system to construct the two percent medical history sample. The sample includes cases in all aid categories: OAS (Aged), AB (Blind), APTD (Disabled), and AFDC as well as containing both cash assistance recipients and the medically needy.

Each person's record in the two percent sample contains the age, sex, aid category, eligibility status (cash assistance or medically needy), and county of residence of the individual. It also contains detailed information on medical services utilization. Because the person is chosen on the basis of an identification number from the file of eligible persons, his record will also indicate the absence of use of any or all services. Information on hospital inpatient utilization includes number of admissions (if any), length of stay (if an admission), diagnosis, and cost of each stay. Hospital outpatient data includes number of visits, diagnosis and cost for each visit.

Data on physician services includes detailed information on number of visits or services, type of procedures performed at each visit, cost for each service, etc. The procedure data is quite detailed and accurately reflects services for which claims are made by physicians. Procedures codes for

physician services can be divided into general office visits, laboratory, radiological, other diagnostic services and surgery, permitting analysis of separate categories of physician services. The procedure codes used by California in 1969 were those from the 1964 Relative Value Studies, Fourth Edition, published by the California Medical Association. Similar detail is available for laboratory, radiological, other diagnostic services and surgery. Information on prescription drugs includes drug identification codes, size of prescription (e.g., number of milligrams) and cost of prescription.

For the purposes of the present study, the population analyzed was strictly defined. First, only data on AFDC families was used. Our major interest is in the effect that variations in provider resources and other variables have on utilization of services. Presumably, many of the findings based on the AFDC population alone will be applicable to other populations as well. More important, however, data on aged Medicaid recipients were incomplete for most of the more important services because of combined Medicare-Medicaid coverage. For the Blind and Disabled, there were insufficient observations for the type of analysis we performed.

Second, only families eligible for the full year were included because of the variations across counties in length of eligibility of the past year population. Because utilization will in part be dependent on length of eligibility, variations in the average number of months of eligibility across counties would yield data which is difficult, if not impossible, to interpret. Third, the following services were included: (1) hospital inpatient care, (2) hospital outpatient services, (3) physician services, (4) lab and x-ray, (5) surgery, and (6) prescription drugs.

Unfortunately, there were an insufficient number of observations in several cells. We chose to reject any age-sex-county cell with fewer than twenty observations.⁶ One result was the elimination of all medically needy recipients as well as all cash assistance recipients over forty-four years of age. It was also necessary to reject thirteen counties entirely. In addition, we aggregated certain contiguous counties of similar density and availability of medical resources to increase our observations of experience in rural areas. Data on twenty-one counties and three county groups were used. Group I counties included Alpine, El Dorado, Ingo, Lassen, Mariposa, Modoc, Mono, Nevada, Placer, Plumes, Shasta, Sierra, Siskiyou and Trinity. Group II counties were Del Monte, Humboldt, Lake and Mendocino. Napa and Sonoma counties formed Group III. When all deletions because of insufficient observations were made, over 25,000 observations in 129 age-sex-county cells for the two year period remained. The average number of observations in each cell was 196.

Separate utilization rates were developed for males and females in two age groups: under sixteen and sixteen to forty-four. In general, we used the following measures of utilization: the number of users per eligible person, services per user, services per eligible person, costs per user and costs per eligible person. However, there are exceptions and particular

6. We tested the sensitivity of the results to the presence of small sized cells by re-estimating several equations using no cells with fewer than fifty observations and found little difference in the results. A statistical problem known as heteroscedasticity may remain. If the variance around cell means in small sized cells is larger than that in cells with large numbers of observations, the result will be greater standard errors and fewer significant coefficients. There is no reason to believe that coefficients will be systematically affected, thus the reported results are not biased by the presence of cells based on relatively few observations.

utilization measures will have service-specific meanings. Thus, some discussion of dependent variables is in order.

For hospital inpatient care, admissions per eligible, days per eligible and cost per eligible rates were developed for each group in each county. There was not a sufficient number of observations for examining determinants of lengths of stay or costs per episode. As a result, the influence of certain explanatory variables on days per eligible person and costs per eligible person is strongly influenced by the impact of those variables on admission rates. Days per eligible will also reflect the impact of length of stay and the results of certain explanatory variables will also differ in these equations from their effects in the admissions equations. Results will also differ in the costs per eligible regressions from the admissions and length of stay regressions because the former will reflect intensity of care, quality of service and amenity levels as well as admission and length of stay.

In the physician visit analysis, several types of visits are aggregated. All initial and follow-up visits, home visits, hospital visits, consultations and well-baby care are included. We estimated the impact of several variables on the percentage of eligibles who had a physician visit (henceforth called users per eligible), the number of visits per user and per eligible and costs of visits per user and per eligible. Visits per user will reflect the number of follow-up visits as well as visits with new symptoms. Visits per eligible is the product of the users per eligible and visits per user ratios and will thus reflect the probability of seeing a physician as well as the amount of follow-up care. Cost per user and cost per eligible will differ from the visit variables in that they contain an implicit set of weights attaching to each visit. In using the 1964 California Relative Value Schedule to

determine the amount to be paid for each visits, the state assigns a set of index numbers or weights to each visit. Thus, a routine initial office visit by a new patient or for a new illness including history and examination is assigned a value of 2.0 while an initial office visit with a complete diagnostic history and physical examination in the case of a new patient or a major illness and including the initiation of diagnostic and treatment programs is assigned a value of 6.0. Physicians will be reimbursed a fixed amount for each RVS unit. While there were a few exceptions, practically all physicians were paid \$6 for each RVS unit in 1969 and 1970. Thus differences in cost per user and cost per eligible person do not reflect pricing variations. Therefore, costs per user will reflect the number of visits per person seeing a physician at least once as well as the complexity or comprehensiveness of those visits. Costs per eligible will reflect both the probability of seeing a physician as well as the number, comprehensiveness and complexity of those visits.

The data base permitted us to separate laboratory, x-ray and other diagnostic services from physician visits. "Other diagnostic services" include electrocardiograms, phonocardiograms, vectorcardiograms, various allergy tests, etc. We considered the impact of the resource availability variables and other factors on the percentage of eligibles who had a diagnostic service (henceforth called users per eligible), the number of services per user and per eligible and costs of services per user and per eligible. Users per eligible is a measure of the likelihood of receiving a diagnostic service. Services per user is a measure of the volume of tests for each person receiving at least one diagnostic service. Services per eligible person is the product of the users per eligible person and the

services per user variables and is the total number of diagnostic services per eligible person. Costs per user and per eligible person will differ from the services variables only as the complexity of the service differs. Use of the relative value schedule again provides a weighting system, with more complex procedures receiving higher weights. Higher weights are reflected in the data as higher costs.

Surgical procedures are also separated from other physician services. We analyzed factors affecting the percentage of eligibles receiving at least one surgical procedure, the number of surgical procedures per eligible and cost of surgical procedures per eligible. The last of these is the most interesting because it alone is dominated by the major surgical procedures. The percentage receiving at least one surgical procedure includes all individuals receiving any surgery including even minor operations such as a repair of a laceration. Services per eligible person will include all operations, large and small, and will also include billings by more than one physician for the same procedure. For example, a surgeon, a physician assisting at surgery and an anesthesiologist may all present claims for the same procedure. Costs per eligible person will be essentially the number of surgical procedures weighted by complexity and divided by the number of eligible persons. The weights are the relative values attached to the surgical procedures by the 1964 edition of the California Relative Value Schedule.

Though there may be some disagreement on the accuracy of the assigned relative values, the schedule for the most part will give greater weights to more complex procedures. Weights given to some common surgical procedures are the following:

Simple Repair of Wound, up to 2 1/2 inches	2.0
For each additional inch	1.0

Dilation and Curettage	15.0
Herniorrhaphy	
Inguinal, unilateral	35.0
Femoral, unilateral	35.0
Ventral, incisional	45.0
Hemorrhoidectomy	
External, complete	20.0
Internal and external	30.0
Radical	40.0
Tonsillectomy with or without Adenoidectomy	
Under age 18	15.0
18 years and over	20.0
Appendectomy	40.0
Mastectomy	
Complete (simple)	30.0
Radical	70.0
Hysterectomy	
Total (corpus and cervix) with or without tubes, and/or ovaries, one or both	60.0
Radical, for cancer including regional lymph nodes	100.0
Cholecystectomy	60.0
With open exploration of common duct	70.0

Because these index numbers are used to price each surgical procedure, cost per eligible person becomes a weighted sum of the number of surgical procedures per eligible person.

In the prescription drug analysis, we employed the percent of eligibles with one prescription, prescriptions per user cost per user, prescriptions per eligible and cost per eligible person as dependent variables. Comparable variables were developed for hospital outpatient services. Hospital outpatient care includes all services rendered in a hospital outpatient setting-visits, lab tests, x-rays, etc., for which the Medi-Cal program is billed directly by the hospital. As above, the users per eligible variable will reflect the number of eligible persons using at least one service. Services and costs per user will reflect the number of services rendered to each person with at least one contact with the cost variable also reflecting the intensity or complexity of services. Services and cost per eligible person

will reflect both the likelihood of using services and the amount of care received.

It was necessary to add other data to that available on the paid claims system.⁷ The availability of the data by county of residence permitted merging of information from other sources. Data on independent or explanatory variables taken from observations on the county of residence were added to the utilization data base. Additions included information on hospital bed availability such as total beds per capita and the ratio of city and county hospitals to all hospitals. Bed availability data were provided by county from the California Department of Public Health. Data on total physician availability, physicians in office-based practice and hospital-based practice and the allocation of office-based practice between general practice, medical specialties, surgical specialties and other specialties is available by county as well. These data were obtained from the Distribution of Physicians, Hospitals and Hospital Beds in the U.S., 1969, American Medical Association, Vol. 1, 1970, and the Distribution of Physicians in the United States, 1970, American Medical Association, 1971. More detailed data on physicians by specialty by county were provided by the California Medical Association.

A dummy variable for the San Joaquin age-sex cells was used to measure the net effect of the foundation. Only San Joaquin county was used; the other

7. Data on physician or bed availability and the racial and ethnic composition of the population have a unique value for each county. We implicitly assume that the effects of each county-specific variable will not differ systematically across age-sex groups. The estimated impacts of each county-specific variable is then an average effect for all four groups combined. The fact that the county data will have a unique value for each county in both years will bias the standard errors toward zero to the extent that unmeasured characteristics of a state have similar effects on the dependent variables in both years. Since the bias is not likely to be very large and since pooling the data adds legitimate information, it was decided best to expand the sample through pooling.

the net effect of the foundation. Only San Joaquin county was used; the other three counties in the prepayment project (Amador, Calaveras and Tuolumne) were excluded because of too few observations. A variable measuring the density of county was included. This was measured by dividing the population by the square mileage of the county. An urban-rural dummy variable was used as an alternative to the density which was highly correlated with physician availability. All counties classified by the Bureau of Census "County Group Classification" system as a county in an SMSA with over 500,000 persons are included as urban counties. The classification of counties as urban or rural is given in Table I.

Data on the percentage of public assistance families who are Negro or Spanish-language or Spanish-surname was available by county from the 1970 Census. Both were included as independent variables throughout the study. A final control variable used in the analysis was the percentage of the county families below the poverty line receiving public assistance. This variable served as a proxy for the support given the program by the county welfare office. Officials at the local level play an important role in advising individuals of their right to care and on the availability of willing providers.

The variation in the independent variables used in the study is shown in Tables I and II. In Table I, various measures of physician availability are displayed. Several ratios are interesting in themselves. First, as one would expect, physician-population ratios tend to be higher in urban than in rural counties. The supply of physicians varies from 7 physicians per 10,000 persons in Kings and Merced counties to 53.5 per 10,000 persons in San Francisco. Three counties or county groups have more than 20

TABLE I
THE SUPPLY OF PHYSICIAN MANPOWER IN SELECTED CALIFORNIA COUNTIES

Urban- Rural Status	All Physicians Population	Office-Based Physicians		Surgeons Population	General Practitioners		Specialists* Physicians	General Practitioners*		Hospital-Based Physicians
		Population	Population		Population	Population		All Physicians	All Physicians	
Alameda	U	19.0	16.5	5.8	3.2		.81	.19		.14
Contra Costa	U	11.8	10.9	3.4	2.7		.75	.25		.07
Fresno	R	13.1	11.5	3.9	3.0		.74	.26		.14
Kern	R	10.4	9.2	3.2	2.8		.69	.31		.11
Kings	R	7.0	6.5	1.9	3.9		.41	.59		.07
Los Angeles	U	20.2	16.9	5.3	3.5		.79	.21		.16
Merced	R	7.0	6.6	3.1	2.2		.67	.33		.05
Monterey	R	11.3	10.4	5.1	2.2		.79	.21		.08
Orange	U	13.7	12.1	3.9	3.2		.74	.26		.11
Riverside	U	12.2	10.9	4.1	3.4		.69	.31		.10
Sacramento	U	16.4	14.2	4.6	3.5		.66	.34		.13
San Bernardino	U	14.1	11.6	3.5	2.8		.63	.37		.18
San Diego	U	15.5	13.5	5.4	3.4		.75	.25		.13
San Francisco	U	53.5	39.4	14.2	3.4		.91	.09		.26
San Joaquin	R	14.5	12.0	3.7	3.2		.73	.27		.18
San Luis Obispo	R	11.1	9.3	3.9	2.5		.74	.26		.17
Santa Barbara	R	17.9	16.3	5.7	3.3		.80	.20		.09
Santa Clara	U	22.4	18.3	5.8	2.3		.87	.13		.18
Stanislaus	R	12.1	11.3	3.4	3.5		.69	.31		.06
Tulare	R	10.0	8.7	2.1	3.7		.58	.42		.13
Ventura	R	13.0	10.6	2.9	2.7		.74	.26		.18
Group I	R	11.9	10.6	2.9	4.6		.57	.43		.10
Group II	R	14.0	11.7	2.4	5.0		.58	.42		.16
Group III	R	19.2	15.8	4.0	4.8		.70	.30		.18
Range - Urban Counties	Low High	11.8 53.5	10.9 39.4	3.4 14.2	2.3 3.5		.63 .91	.09 .37		.07 .26
Range - Rural Counties	Low High	7.0 19.2	6.5 16.3	1.9 5.7	2.2 4.8		.41 .80	.20 .59		.06 .18
San Joaquin Ranking		9th	10th	13th	13th		13th	12th		2nd

* refers only to office-based physicians

physicians per 10,000 persons (San Francisco, Los Angeles and Santa Clara) while nine (Contra Costa, Kern, Kings, Merced, Monterrey, San Luis Obispo, Tulare and the Group I counties) have fewer than twelve doctors per 10,000 persons. Second, the ratio of surgeons to population also varies considerably. Four counties have more than 5.5 surgeons per 10,000 persons (Alameda, San Francisco, Santa Barbara and Santa Clara) while three (Kings, Tulare and the Group II counties) had fewer than 2.5 surgeons per 10,000. Third, over 40 percent of physicians are general practitioners in Kings, Tulare and the Group I and Group II counties, while fewer than 15 percent of the physicians in Santa Clara and San Francisco counties are general practitioners.

Table II provides data on the racial and ethnic composition of the eligible population, availability of hospital beds and the ratio of families on public assistance to families below the Census poverty line. Blacks tend to be concentrated in counties such as Alameda, Los Angeles and San Francisco and are a very small proportion of the population in most rural counties. Spanish-surnamed individuals are more evenly distributed throughout the state with the exception of small rural counties such as the Group I and Group II counties. Hospital beds are far more evenly distributed throughout the state than physicians. Many rural counties in particular have more than forty beds per 10,000 residents. Only one rural county has fewer than thirty-five beds per 10,000 residents.

Unfortunately, data on income of public assistance recipients were not available on the 2 percent sample. While within county variance in income of public assistance families may be large, the cross county variance in mean public assistance income is likely to be quite small. The maximum grant

TABLE II
SELECTED DATA ON CALIFORNIA MEDICAID POPULATION AND HOSPITAL BED AVAILABILITY
BY COUNTY, 1969

	<u>Blacks</u>	<u>Spanish Surnamed</u>	<u>Poverty</u>	<u>Public Beds</u>	<u>Beds Population</u>
Alameda	.385	.155	1.056	.26	35.0
Contra Costa	.219	.131	1.261	.17	28.5
Fresno	.119	.385	.899	.19	37.9
Kern	.115	.230	.815	.22	35.0
Kings	.125	.407	.813	.32	43.8
Los Angeles	.263	.273	1.014	.23	38.9
Merced	.128	.254	.817	.24	36.5
Monterey	.067	.375	.707	.29	30.5
Orange	.018	.169	.819	.18	28.2
Riverside	.086	.253	.773	.20	41.4
Sacramento	.129	.147	1.160	.18	40.4
San Bernardino	.086	.222	.911	.27	37.5
San Diego	.109	.198	.698	.34	28.1
San Francisco	.327	.183	.935	.42	70.1
San Joaquin	.139	.259	.995	.21	37.2
San Luis Obispo	.015	.227	.804	.20	32.7
Santa Barbara	.036	.356	.793	.18	45.9
Santa Clara	.035	.336	1.172	.29	35.9
Stanislaus	.023	.148	1.050	.10	48.3
Tulare	.037	.357	1.011	.13	37.9
Ventura	.038	.286	.746	.25	36.5
Group I	.012	.070	.908	.12	42.1
Group II	.004	.035	.896	.17	42.3
Group III	.012	.112	.772	.22	36.7
Range: Urban	.018	.135	.698	.17	28.1
High	.385	.336	1.261	.42	70.1
Rural	.004	.035	.707	.12	30.5
High	.139	.407	1.050	.32	48.3
San Joaquin Ranking	5th	8th	8th	13th	13th

(payment to families with zero earned income) paid by the state is constant across counties, as is the marginal tax rate. Variations in family income could result from differences in work related expenses, employment opportunities and county supplementation of state payments. Two proxy or substitute variables were developed. First, information on mean public assistance income by county available from the 1970 Census was used. While this income data is probably underreported, the propensity to underreport is unlikely to vary much across counties. Second, because county supplementation, employment opportunities, and work related expense allowances are likely to vary with the wealth of the county, per capita income of the county was also employed as a proxy income variable. Such a variable would not be easily interpreted but would probably serve to reduce any bias which may result from the absence of an income measure. Both of these variables were introduced in separate regressions but were consistently insignificant. They were dropped from the reported equations with no effect on the coefficients of the remaining regressors. Finally, it should be noted that if the actual income of the public assistance eligibles is not highly correlated with other included independent variables, the result will be an increase in the error term (reduction in R^2) with little bias in the coefficients of the explanatory variables.

IV. Empirical Results

Tables III-VIII following this section present the final regression estimates. Regressions for urban, rural, and all counties are displayed. The discussion will focus primarily on the urban and rural regressions; the all county regressions provide information on urban-rural differences, when other variables are held constant, and on the San Joaquin variables. Following the format used in the previous section, the discussion will be organized around specific explanatory variables and their impacts on all services.

A. Physician Supply

In urban counties the net effect (at the mean) of the physician supply variables on hospital admissions, days, and costs per eligible was positive. The variables were significant in the admissions' equation but not in the days' and expenditure equations, suggesting that the primary effect of physician supply is on admission rates. Days and costs per eligible are positive because the admissions' rate is a component of those variables. The net effect of the physician supply variables becomes negative beyond the mean physician supply (20.8), suggesting a saturation point. The admissions increasing effect of a large physician supply is consistent with the demand shift hypothesis--that demand for inpatient care is not exogenously determined, but is strongly influenced by physicians' recommendations. The amount of inpatient care that physicians will want to perform will in turn depend on the stock of physicians relative to population. The positive reaction occurs at levels of physician supply which are rather high by national standards, suggesting that an explanation of excess demand is implausible and that, more likely, physicians are reacting to declining

exogenous demand by increasing service provision to their smaller patient share.

In the physician visit equations, we found evidence of a strong effect of physician supply on access to private physicians in urban counties. More Medicaid eligibles receive medical services from private physicians in urban areas with a more abundant physician supply. The estimated elasticity of the user-eligible variable with respect to the supply of office-based physicians, at the mean value of both variables, was .38. As will be shown below, it appears that some of the increase in the percentage of eligibles seeing private physicians is the result of a reduction in use of hospital outpatient settings. Thus, there is more a substitution of delivery setting than increase in medical service utilization.

In rural areas increases in the supply of physicians do not appear to affect the percentage of Medicaid eligibles seeing private physicians. Rural physicians may have a greater feeling of responsibility for the resident population than urban physicians. Those who need care are seen even if it requires longer hours. A nationwide survey of physicians in 1971 showed that the average number of hours of direct patient care for all physicians was 50.5 in non-metropolitan areas and 45.5 in metropolitan areas. In urban areas, the relationship between physicians and the resident population is less personal and physicians can more readily assume that patients can be seen by another doctor or that care can be received in hospital outpatient centers or public clinics. As a result, increases in the physician supply in rural areas would not increase access to private physicians, but would ease the workload of those physicians. In urban areas, increases in the number of physicians would increase the availability of private care

settings to the poor. As physician supply increases, doctors have more time and are more likely to render care to Medicaid eligibles.

In rural counties, a reduction in inpatient care appears to result from increases in physician availability. The net effect of the physician availability variables is negative in all equations and statistically significant in the admissions and costs per eligible regressions. When physicians are in relatively short supply, as they are in rural areas in California, Medicaid eligibles seem to be more frequently dispatched to hospital settings. This reflects a greater use of hospital manpower resources when a physician's own available time is scarce. When the supply of physicians increases, physicians have less need to rely on hospital resources. This may reflect a pattern of care for treatment of the poor, in particular the Medicaid eligible poor, rather than a general pattern of care.

In urban areas, use of laboratory, x-ray, and other diagnostic services appears to increase with the availability of physicians as expected. In the urban county regressions, the percentage of eligibles receiving a diagnostic test is markedly higher where physicians are in abundance. A 1.0 percent increase in the physician-population ratio would result in a 1.6 percent increase in the user-eligible ratio (at the mean levels for both ratios). The number of services per user increased and costs of diagnostic services per user decreased as physician availability increased, but neither variable was statistically significant. The net effect of a 1.0 percent increase in the physician population ratio is a .4 percent increase in services per eligible and a 1.0 percent increase in costs per eligible person.

In rural areas we observed no statistically significant impact of physician availability on any utilization measure. This seems to follow

from the absence of any observed effect of physician availability on the number of physician visits in rural areas. Medicaid eligibles in rural areas with more abundant supplies of physicians do not seem to receive more comprehensive diagnostic services than do Medicaid eligibles in areas with relatively few physicians. This again suggests that the immediate effect of increasing the supply of physicians in rural areas would be to reduce the patient loads of the present supply of physicians with little change in the number of services received by the poor.

The availability of physicians appears to have different effects on prescription drug use in urban and rural counties. In urban counties prescription drug utilization appears to increase with physician availability. This is consistent with the view that drug prescriptions will increase with the number of physician contacts. As discussed above, physician visit rates were strongly associated with physician availability. In addition, other services such as inpatient care, surgery, and laboratory, x-ray, and other diagnostic tests also increased with physician availability. The regression results suggest that an increase in the supply of physicians from eleven per 10,000 persons to fifteen per 10,000 persons would be associated, *ceteris paribus*, with an increase in the percentage of eligibles receiving prescriptions from 54 percent to 63 percent, and an increase in prescriptions per eligible person from 3.7 to 4.3.

In rural counties prescription drug rates appear to be stable or perhaps to fall with increases in physician availability (through the range of most existing physician population ratios). The physician availability variables were not statistically significant, perhaps due to multicollinearity between the two variables. The predicted values are interesting,

nonetheless. The percentage of eligibles with drug prescriptions falls from .66 to .57 in response to an increase in the physician supply from eleven per 10,000 persons to fifteen per 10,000 persons. The decline suggests that drug prescribing rates are higher in rural areas where physicians are in particularly short supply. Physician visit rates do not increase as physician supply increases, which suggests that physicians spend more time with each patient as patient loads of physicians decline. As more time becomes available per patient, drug prescriptions decline. Once again, the physician availability variables are not statistically significant in the rural regressions, so there is no conclusive evidence of reduced prescription drug use.

The availability of office-based physicians is negatively related, as expected to use of care in outpatient settings. The percentage of eligibles using services in outpatient settings as well as the number of services and costs per eligible person all are negatively related to the ratio of office-based physicians as expected. Each of these dependent variables was positively related to the square of the physician population ratio, indicating that use of outpatient services declines but at a declining rate. The results clearly show a substitution of outpatient services for care by private physicians. While use of outpatient services is more prevalent in urban than in rural counties, rates of use decline sharply with increases in availability of office-based physicians in both areas. In urban counties the proportion of eligibles using outpatient services declines from .25 to .18 and the number of visit per eligible person falls from .69 to .58 in response to an increased in the physician population ratio from 11 to 15 per 10,000 persons. The proportion of eligibles using outpatient services declines from .17 to .15 and the number of visits per eligible person decreases from .48 to .37 in rural

counties for the same increase in physician availability. Costs per eligible do not appear to decline at the same rate in either urban or rural areas as the number of persons with outpatient care contacts or the number of services per person.

B. Physician Specialty Distribution

The ratio of general practitioners to all physicians was used to test the hypothesis that access of the poor to private physicians is positively related to the availability of general practitioners. General practitioners see more patients and are more likely to have the poor as patients than are specialists.

We found evidence that an increase in the supply of general practice physicians would increase the access of the poor to physician care, other factors being equal. However, the number of services and cost of care appear to decrease. It is impossible in this study to determine if utilization differences are due to changes in the quality of care or merely to higher prices for specialists' services. The study showed that in urban counties more eligibles saw office-based physicians, the greater the proportion of those physicians who were general practitioners. While more eligibles are seen, it appears that they receive less complex and less costly services. In rural counties, the percent of physicians who are GPs does not affect the number of eligibles receiving services. However, the number of services and costs of services per user fall as the GP-physician ratio increases, suggesting fewer return visits.

Considering urban and rural regressions together, there was no relationship between the relative availability of GPs and prescription drug use. However, this conceals contradictory effects occurring in urban and rural areas.

In urban areas an increase in the proportion of physicians who are GPs would increase the percentage of eligibles using prescription drugs and the number of prescriptions per eligible. An increase in the ratio of GPs to all physicians by one percent would increase the percentage of eligibles using prescriptions by .49 percent and the number of prescriptions per eligible person by .73 percent. This is consistent with the argument that prescription drug rates are positively related to physician visit rates. As noted above, the latter are related to the availability of general practitioners. In rural areas an increase in the proportion of physicians who are GPs reduces the number of prescriptions per user and per eligible person. Prescriptions per eligible person fell by .76 percent in response to a one percent increase in the proportion of physicians who are GPs. In rural areas the percent of physicians who are GPs does not affect the number of visits but may affect the thoroughness of diagnosis and treatment. That is, as the relative availability of general practitioners increases, more time is allocated to each patient resulting in less prescription drug use.

General practitioners appear to provide fewer lab, x-ray, and other diagnostic services. This pattern does not occur in urban areas, where general practitioners seem to practice in ways similar to other physicians. In rural areas, however, general practitioners prescribe fewer diagnostic tests. All dependent variables were affected negatively in rural areas. That is, the general practitioner in rural areas provides fewer ancillary services and less costly care.

There is a significant reduction in hospital outpatient care when GPs are relatively abundant. In the regressions using data from both urban and rural counties, the percentage of eligibles using outpatient services as

well as the number of services per user, the number of services per eligible and the level of costs per eligible are reduced. In urban areas the major effect is on the percent of eligibles using outpatient care. Services per eligible person and costs per eligible person do not appear to decline as the availability of GPs increases. In rural areas the substitution effect is much stronger. The percentage of eligibles receiving care in outpatient settings as well as services and costs per eligible fall as the proportion of physicians who are GPs increases.

The ratio of specialists to all physicians was used to control for the influence of physician specialization on use of inpatient care. In urban counties the variable was positively related to admissions and statistically significant, as expected. Holding other variables constant, increases in the supply of specialists would markedly increase bed utilization. In rural areas the variable was positive but not significant. This may be related to the way general practitioners use hospitals in rural areas. GPs may hospitalize more patients, particularly patients with complex cases. That is, difficult cases which in urban areas are treated by specialists may receive care from GPs in hospitals in rural areas. This would mute the bed utilization increasing effect of specialists. Because GPs are not as important in the provision of primary care in urban areas, this effect is not as important.

Increases in the supply of surgeons would have significant effects on the amount of surgery performed. It was beyond the scope of this study to determine whether increases in surgery reflect the delivery of care to those whose needs would otherwise have gone unmet or the provision of surgery which is unnecessary or discretionary. We looked at the effect of

availability of surgeons on the percent of eligible having surgery, the number of surgical procedures per eligible person, and the cost of surgical procedures per eligible person. The analysis was complicated by the fact that many relatively minor surgical procedures are included. For example, the average cost per surgical procedure for the two year period was equal to \$36.92. Because charges for each service are set by the California relative value schedule, cost data served as a useful proxy for the complexity or difficulty of surgical procedures. In urban counties outlays on surgery increased by 66 percent in response to a doubling of the number of surgeons from three to six per 10,000 persons. In rural counties outlays increased by 61 percent in response to an increase in the surgeon population ratio from two to four per 10,000 persons, the range of surgeon availability in most rural counties. The results indicate that increases in surgeons result in increases in surgery but only up to a point. That point seems to be reached in California at around eight surgeons per 10,000 persons in urban counties and four per 10,000 persons in rural counties. This latter conclusion is quite tentative because of the very limited numbers of observations on counties where the supply of surgeons exceeded these levels.

C. Hospital Bed Availability

In the urban county regressions the bed availability variable was significant and had a strong positive effect on admission rates. The beds variable was also positive but not significant in the days per eligible and costs per eligible equations. This suggests that length of stay, service intensity, amenities, etc., are not as strongly related to bed availability as admission rates. In rural areas the bed availability variable is not related to any of the hospital bed utilization variables. The absence of

the expected effect suggests that the supply-creates-demand phenomenon is less prevalent among rural hospitals than among those in urban counties.

The ratio of public to total beds was negatively related to the inpatient utilization variables as expected. In the regressions using data from all counties, the variable was significant and negative in the admissions, days, and costs per eligible equations. Assuming all other factors constant, a one percent increase in the proportion of beds that were in the public sector would reduce admission by .31 percent, days per eligible by .38 percent, and costs per eligible by .50 percent.

In urban counties, the public beds variable was negative in all regressions but significant only for admissions rates. The number of admissions per eligible person would increase by .65 percent in response to a one percent decline in the public bed ratio. The absence of the negative impact on days and costs per eligible could reflect longer stays in public hospitals. Some effort was made by the state to concentrate longer stay patients in county rather than private hospitals. For example, patients whose cases exceeded eight days were subject to review and, if in a private hospital, were sometimes transferred to county hospitals. This effect could dominate the influence both of lower per diem cost of public hospitals as well as the lower admission rates when public beds are a large share of all beds and thus result in insignificant coefficients.

In rural counties, the public beds variable was significant in two regressions and almost significant in the third (admissions). The results indicated that, *ceteris paribus*, a one percent increase in the ratio of public to all beds would result in a .65 percent decrease in admissions rates, a 1.25 percent reduction in days per eligible person and a 1.81 percent decline in costs per eligible person.

D. San Joaquin

The dummy variable for the San Joaquin county observation was used to investigate whether utilization rates for various services would have been different in absence of the utilization review efforts in that county. San Joaquin observations were included in the all county regressions and the rural county regressions. We found no evidence that the San Joaquin Foundation had any effect on the percentage of eligibles seeing physicians or on numbers of visits or cost of visits. If the San Joaquin variable were negative in the visits per user equation but positive in the costs per user equations, it would suggest that the Foundation was reducing the number of visits but increasing the comprehensiveness of the care provided. The signs on the coefficients for the San Joaquin variable were negative in the visits per user equations and positive in the costs per user equations, but always had very low t-values. Thus there is no evidence to support a change in the pattern of care delivery as well as no evidence of an impact on utilization rates.

In the equations using rural counties the San Joaquin variable was negative with a t-value exceeding one in the users per eligible person and services per eligible person regressions. While these results are not conclusive evidence of lower rates of provision of diagnostic services in San Joaquin county, they do suggest that these rates may have been lower than they would have been in absence of the program.

The dummy variable for the San Joaquin county observations was positive but not significant in the all county and rural county regressions. The San Joaquin variable was positive with fairly high but insignificant t-values in each user per eligible regression. For example, the San Joaquin

variable had a t-value equal to 1.90, close to that customarily required for statistical significance. While nothing conclusive can be inferred, the estimates suggest that the percentage of eligibles undergoing surgical procedure may have been higher in San Joaquin county than in other counties, all else being equal. San Joaquin county was not significantly different from other counties in the cost per eligible equations. Thus, the result may indicate greater access to care by surgeons but no greater and perhaps less provision of the relatively costly surgical procedures.

The San Joaquin Foundation was not at risk for hospital inpatient or outpatient services or prescription drugs, yet these services would undoubtedly be affected by effective review of covered services. For example, control over physician services such as surgery should directly affect hospital admission rates. Secondly, uncovered services may be substituted for covered services--e.g., increased referrals to hospital settings, more drug prescriptions, etc.

In the hospital inpatient regressions using data from all California counties, there were no significant coefficients. In the rural county regressions, the coefficients on the San Joaquin variable were positive and had t-statistics near or greater than unity. The results thus indicate that hospital utilization rates in San Joaquin county were no lower, and may have been higher than they would have been in absence of the prepayment arrangement.

The dummy variables for the San Joaquin county observations were also insignificant in each hospital outpatient regression; there was no evidence that rates of utilization of outpatient services in San Joaquin were any different than they would have been in absence of the prepayment program. Thus, there is no evidence for the hypothesis that the foundation would

result in less use of care in outpatient settings by increasing care by office-based physicians, nor for the view that frequent denial of claims would lead to greater use of outpatient settings.

In the prescription drug regressions using data from all counties, the San Joaquin variable was positive in each equation and significant in the prescriptions per eligible equation. The results indicate that Medi-Cal eligibles in San Joaquin county received on average over one prescription more per eligible person than they would have been expected to have received, based on statewide experience. That is, given the racial and ethnic composition of its eligible population, the supply of physicians, GPs, etc., prescription drug use in San Joaquin county was high relative to other counties during this period. This may indicate either better medical treatment or excessive use of prescription drugs. In the rural county regressions the San Joaquin variable is never near statistical significance. That is, there is no statistically significant difference in use of prescription drugs in San Joaquin county relative to that experienced in other rural counties. It should be noted again that San Joaquin was not at risk for prescription drug use at this time, so these results in no way reflect on the effectiveness of the prepayment program.

E. Racial and Ethnic Composition

Low income blacks and Spanish-surnamed families living in urban counties appear to have less access to health services than poor whites, despite complete financial coverage under Medicaid. Both groups seem to be less likely to have physician visits, and have less surgery, fewer diagnostic services, and receive less inpatient care. In rural areas Spanish-surnamed families appear to have at least equal access to most services, and in fact receive more surgery and more inpatient care than whites. There is no difference in use of services

between blacks and whites in rural counties, except for inpatient care where utilization rates are again lower for blacks. When other variables are controlled for, residents of urban counties also appear to have more visits to both private physicians and outpatient departments, more surgery, and more prescription drugs than Medicaid eligibles in rural counties.

TABLE III
PHYSICIAN SERVICES REGRESSION RESULTS
ALL COUNTIES

	CONSTANT	POV	SJ	MALES-II	FEM-II	FEM-II	BLACK	SPAN	CP	DOCS	DOCS ²	URBAN	$\bar{R}^2$
USERS/ ELICIBLES	.28* (1.97)	.11 (1.82)	.01 (0.32)	-.12** (4.35)	.01 (0.60)	.12** (5.69)	.03 (0.28)	.10 (0.94)	.22 (1.64)	.03** (2.51)	-.0009** (2.59)	-.08** (3.29)	.46
SERVICES/ ELIGIBLES	3.31* (2.03)	-.15 (0.21)	-.01 (0.03)	-.68* (2.27)	-.02 (0.08)	2.66** (11.31)	1.39 (1.28)	1.60 (1.40)	.17 (0.10)	-.07 (0.48)	.0008 (0.21)	.43 (1.65)	.60
SERVICES/ USERS	8.69** (4.47)	-1.27 (1.53)	-.17 (0.31)	.07 (0.18)	-.13 (0.46)	2.66** (9.44)	1.48 (1.15)	1.47 (1.07)	-1.49 (0.77)	-.43** (2.49)	.01* (2.22)	1.34** (4.36)	.53
COSTS/ ELICIBLES	31.63 (1.52)	-1.92 (0.22)	2.92 (0.51)	-5.16 (1.34)	-1.06 (0.36)	27.92** (12.58)	-.44 (0.03)	18.65 (1.27)	-14.40 (0.70)	-1.08 (0.58)	.03 (0.55)	13.26** (4.01)	.66
COSTS/ USERS	90.94** (3.30)	-14.18 (1.21)	3.55 (0.47)	4.57 (0.90)	-2.00 (0.51)	42.50** (10.66)	-8.02 (0.44)	18.33 (0.94)	-37.94 (1.39)	-5.68* (2.30)	.17** (2.37)	26.13** (5.98)	.62
URBAN COUNTIES													
USERS/ ELICIBLES	-.19 (0.61)	.13 (1.19)		-.16** (5.41)	-.01 (0.51)	.09** (3.39)	-.23* (2.03)	-.41 (1.80)	.73 (1.66)	.08** (4.11)	-.002** (3.75)		.57
SERVICES/ ELICIBLES	4.31 (1.30)	-2.17 (1.77)		-.81** (2.50)	-.23 (0.80)	2.64** (9.33)	.31 (0.25)	-2.24 (0.91)	-1.39 (0.29)	.31 (1.49)	-.01 (1.75)		.70
SERVICES/ USERS	14.39 (3.32)	-4.07** (2.54)		.29 (0.68)	-.24 (0.65)	2.89** (7.83)	2.56 (1.57)	1.21 (0.38)	-7.75 (1.24)	-.39 (1.42)	.007 (0.94)		.58
COSTS/ ELICIBLES	79.18 (1.51)	-30.28 (1.56)		-4.05 (0.79)	-1.04 (0.23)	47.36** (10.57)	-12.80 (0.65)	-31.77 (0.81)	-93.07 (1.23)	2.60 (0.79)	-.10 (1.05)		.71
COSTS/ USERS	214.89 (2.98)	-56.28* (2.10)		10.48 (1.48)	-.33 (0.05)	56.81** (9.21)	5.21 (0.19)	.51 (0.01)	-196.06* (1.99)	-6.64 (1.46)	.13 (1.07)		.63
RURAL COUNTIES													
USERS/ ELIGIBLES	.24 (0.72)	.33 (2.59)	-.03 (0.55)	-.002 (0.05)	.03 (1.13)	.15** (5.36)	.25 (0.76)	.15 (1.15)	.02 (0.10)	.01 (0.23)	-.0003 (0.11)		.37
SERVICES/ ELIGIBLES	5.62 (1.36)	5.05** (3.19)	-.56 (0.95)	-.11 (0.19)	.06 (0.19)	2.71** (7.58)	.55 (0.16)	.63 (0.40)	-4.92* (1.98)	-.90 (1.35)	.03 (1.19)		.57
SERVICES/ USERS	12.29** (2.60)	3.90* (2.16)	-.57 (0.84)	-.17 (0.27)	-.12 (0.31)	2.39** (5.84)	-1.39 (0.30)	-.35 (0.19)	-6.49* (2.24)	-1.44 (1.90)	.05 (1.53)		.44
COSTS/ ELICIBLES	53.83 (1.41)	30.77* (2.11)	-.10 (0.02)	-1.27 (0.24)	-1.59 (0.50)	27.89** (8.44)	5.53 (0.15)	7.53 (0.52)	-37.66 (1.61)	-7.91 (1.30)	.33 (1.15)		.62
COSTS/ USERS	111.56** (2.53)	17.85 (1.06)	1.33 (0.21)	-2.17 (0.36)	-3.81 (1.03)	26.68** (6.99)	-12.88 (0.30)	.91 (0.05)	-49.46 (1.83)	-12.76 (1.81)	.52 (1.60)		.53

NOTE: The terms on the first line of each equation are the coefficients for each regressor. T-values are in parentheses; one asterisk indicates the variable is significant at the .05 level; two asterisks indicates the variable is significant at the .01 level.

TABLE IV
HOSPITAL INPATIENT CARE, REGRESSION RESULTS
ALL COUNTIES

	CONSTANT	POV	SJ	MALES-II	FEM-I	FEM-II	BLACK	SPAN	BEDS	PUB	SPEC	DOCS	DOCS ²	URBAN	R ²
ADMISSIONS/ ELIGIBLES	.20 (1.58)	.03 (0.48)	.009 (0.28)	-.02 (1.09)	-.01 (0.90)	.18** (12.73)	-.04 (0.59)	.13 (1.78)	-.002 (1.13)	-.12** (2.39)	.12 (1.08)	-.01** (2.67)	.0002** (2.62)	.02 (1.13)	.67
DAYS/ ELIGIBLES	1.36 (1.64)	.26 (0.73)	-.02 (0.09)	-.20 (1.62)	-.16 (1.73)	.77** (8.09)	-.29 (0.64)	.32 (0.68)	-.02 (1.35)	-.68* (2.05)	.11 (0.14)	-.04 (1.42)	.001 (1.95)	.03 (0.21)	.50
COSTS/ ELIGIBLES	100.51 (1.37)	23.64 (0.77)	-10.83 (0.62)	-16.30 (1.51)	-14.77 (1.78)	70.14** (8.33)	-20.73 (0.51)	54.90 (1.34)	-1.09 (0.95)	-75.96** (2.62)	12.66 (0.19)	-4.16 (1.57)	.08 (1.83)	11.19 (1.01)	.52
URBAN COUNTIES															
ADMISSIONS/ ELIGIBLES	-3.18 (2.41)	-1.33** (2.50)		-.03 (1.23)	-.01 (0.71)	.20** (10.37)	-1.59** (2.68)	-2.51** (2.57)	.05** (2.46)	-.36* (2.18)	3.88** (2.55)	.08** (2.41)	-.002** (2.46)		.72
DAYS/ ELIGIBLES	-3.05 (0.35)	-1.08 (0.31)		-.17 (1.17)	-.07 (0.52)	.96** (7.65)	-2.35 (0.59)	-3.40 (0.53)	.06 (0.40)	-.70 (0.65)	4.11 (0.41)	.09 (0.39)	-.002 (0.37)		.57
COSTS/ ELIGIBLES	-630.99 (0.80)	-234.58 (0.74)		-13.00 (0.98)	-6.63 (0.58)	94.35** (8.29)	-361.08 (1.01)	-556.16 (0.95)	10.91 (0.84)	-101.51 (1.04)	759.59 (0.83)	17.37 (0.86)	-.44 (0.84)		.61
RURAL COUNTIES															
ADMISSIONS/ ELIGIBLES	.30 (1.19)	-.05 (0.40)	.05 (1.23)	.02 (0.51)	-.01 (0.51)	.17** (8.14)	-.67* (2.24)	.23 (1.82)	-.00 (0.63)	-.17 (1.86)	.30 (1.09)	-.02** (2.76)			.63
DAYS/ ELIGIBLES	4.35 (0.61)	-.51 (0.61)	.24 (0.91)	-.12 (0.56)	-.23 (1.63)	.59** (4.05)	-3.48 (1.71)	.84 (0.99)	-.04 (1.51)	-1.45* (2.30)	-.63 (1.44)	-.07 (1.44)			.39
COSTS/ ELIGIBLES	407.74** (2.95)	-.97 (1.55)	24.32 (1.22)	-3.71 (0.22)	18.47 (1.76)	47.81** (4.40)	435.24** (2.86)	158.29** (2.49)	-2.35 (1.13)	159.10** (3.37)	45.90 (0.34)	-8.94** (2.54)			.48

NOTE: The first term on each line is the coefficient for each regressor.
T-values are in parentheses; one asterisk indicates the variable is
significant at the .05 level; two asterisks indicates the variable
is significant at the .01 level.

TABLE V
REGRESSION RESULTS - LABORATORY, X-RAY AND OTHER DIAGNOSTIC SERVICES
ALL COUNTIES

	CONSTANT	POV	SJ	MALES-II	FEM-I	FEM-II	BLACK	SPAN	GP	DOCS	DOCS ²	URBAN	R ²
USERS/ ELIGIBLES	.16 (1.08)	-.01 (0.21)	-.03 (0.62)	-.05 (1.61)	-.007 (0.31)	.29** (13.36)	.007 (0.07)	.08 (0.71)	-.16 (1.09)	.03* (2.08)	-.0008* (2.18)	-.07** (2.70)	.68
SERVICES/ ELIGIBLES	1.99 (1.73)	-.60 (1.22)	-.18 (0.56)	.17 (0.82)	-.02 (0.13)	2.26** (13.58)	-.25 (0.32)	.17 (0.21)	-1.79 (1.57)	.02 (0.23)	-.002 (0.54)	-.10 (0.55)	.66
SERVICES/ USERS	10.42** (2.86)	-1.95 (1.25)	-.20 (0.20)	1.47 (2.19)	-.13 (0.25)	2.24** (4.25)	-1.46 (0.60)	-.39 (0.15)	-4.62 (1.28)	-.51 (1.58)	.01 (1.24)	.76 (1.32)	.14
COSTS/ ELIGIBLES	12.18 (1.54)	-6.19 (1.83)	.60 (0.28)	.07 (0.05)	-1.19 (1.05)	13.19** (11.49)	-4.95 (0.94)	-3.10 (0.55)	-9.56 (1.22)	.69 (0.97)	-.02 (1.09)	-.36 (0.29)	.60
COSTS/ USERS	63.22** (2.48)	-18.93 (1.74)	1.00 (0.14)	3.91 (0.83)	-5.43 (1.49)	9.81** (2.65)	13.01 (0.77)	-10.11 (0.56)	-22.91 (0.91)	-1.41 (0.62)	-.03 (0.46)	3.44 (0.85)	.07
URBAN COUNTIES													
USERS/ ELIGIBLES	-.14 (0.56)	-.08 (0.90)	-.04 (1.71)	-.04 (1.71)	.01 (0.50)	.30** (14.01)	-.13 (1.34)	-.36 (1.90)	.24 (0.66)	.06** (4.05)	-.002** (3.85)		.82
SERVICES/ ELIGIBLES	.56 (0.23)	-1.50 (1.67)	.38 (1.60)	.38 (1.60)	.09 (0.43)	2.28** (11.08)	-.96 (1.05)	-1.50 (0.84)	-.66 (0.19)	.31* (2.03)	-.009* (2.14)		.70
SERVICES/ USERS	13.74 (1.32)	-3.67 (0.95)	2.45** (2.41)	2.45** (2.41)	.24 (0.27)	2.47** (2.78)	-.16 (0.04)	1.51 (0.20)	-9.70 (0.65)	-.52 (0.80)	.009 (0.52)		.08
COSTS/ ELIGIBLES	-10.38 (0.75)	-9.03 (1.76)	2.08 (1.53)	2.08 (1.53)	.12 (0.10)	14.11** (11.93)	-9.82 (1.88)	-12.21 (1.19)	14.05 (0.70)	3.12** (3.57)	-.08** (3.55)		.75
COSTS/ USERS	18.36 (0.53)	-15.92 (1.25)	11.63** (3.45)	11.63** (3.45)	-.52 (0.18)	13.17** (4.49)	-9.86 (0.76)	6.02 (0.24)	12.78 (0.26)	1.97 (0.91)	-.05 (0.90)		.32
RURAL COUNTIES													
USERS/ ELIGIBLES	.46 (1.11)	.50** (3.13)	-.07 (1.14)	.008 (0.14)	-.04 (1.04)	.29** (8.10)	-.21 (0.53)	.06 (0.39)	-.71** (2.80)	-.06 (0.96)	.003 (0.98)		.64
SERVICES/ ELIGIBLES	3.49 (1.20)	2.69** (2.42)	-.55 (1.32)	.02 (0.04)	-.21 (0.87)	2.26** (8.98)	-1.35 (0.48)	-.70 (0.63)	-5.46** (3.06)	-.40 (0.86)	.01 (0.59)		.66
SERVICES/ USERS	12.53 (2.00)	-.50 (0.21)	-.22 (0.52)	-.45 (1.00)	-.52 (3.67)	1.99** (3.67)	-5.92 (0.96)	-1.89 (0.79)	-6.86 (1.79)	-.72 (0.72)	.02 (0.35)		.24
COSTS/ ELIGIBLES	33.39 (1.53)	13.91 (1.67)	-.13 (0.04)	-1.32 (0.44)	-2.99 (1.63)	12.53** (6.63)	-33.91 (1.59)	-8.44 (1.01)	-41.18** (3.07)	-2.73 (0.78)	.08 (0.48)		.56
COSTS/ USERS	135.50 (1.65)	-23.94 (0.76)	9.63 (0.82)	-7.06 (0.63)	-10.26 (1.49)	7.25 (1.02)	138.99 (1.74)	17.76 (0.57)	-69.54 (1.38)	-5.83 (0.44)	.07 (0.12)		.01

NOTE:
The first term on each line is the coefficient for each regressor.
T-Values are in parentheses; one asterisk indicates the variable is
significant at the .05 level; two asterisks indicates the variable
is significant at the .01 level.

TABLE VI

REGRESSION RESULTS - SURGERY
ALL COUNTIES

	CONSTANT	POV	SJ	MALES-II	FEM-I	FEM-II	BLACK	SPAN	SURG	SURG ²	URBAN	$\bar{R}^2$
USERS/ ELIGIBLES	.16 (1.77)	-.02 (0.27)	.09 (1.79)	-.02 (0.68)	-.0001 (0.004)	.21** (6.02)	-.02 (1.45)	.09 (0.81)	.03 (1.15)	-.004 (1.34)	.076 (1.20)	.30
SERVICES/ ELIGIBLES	.40 (0.78)	.05 (0.12)	.14 (0.53)	-.03 (0.17)	.03 (0.22)	.93** (4.91)	-.52 (0.73)	.63 (0.96)	.03 (0.21)	-.01 (0.71)	.25 (0.96)	.17
COSTS/ ELIGIBLES	-22.70 (1.46)	7.89 (0.63)	-3.93 (0.48)	-2.26 (0.40)	-1.99 (0.45)	48.01** (8.35)	-35.93 (1.66)	34.56 (1.73)	12.62** (2.89)	-1.60** (3.13)	25.39** (2.86)	.45
URBAN COUNTIES												
USERS/ ELIGIBLES	.22 (1.65)	.03 (0.36)		-.02 (0.49)	-.004 (0.12)	.22** (5.02)	-.31 (1.91)	-.42 (1.52)	.03 (0.63)	-.001 (0.65)		.36
SERVICES/ ELIGIBLES	.65 (1.00)	.47 (1.09)		.008 (0.04)	-.03 (0.15)	.81** (4.09)	-.80 (1.00)	-1.15 (0.83)	-.08 (0.39)	.004 (0.41)		.23
COSTS/ ELIGIBLES	2.94 (0.13)	12.40 (0.81)		-2.63 (0.37)	-.49 (0.08)	54.50** (7.12)	-71.70** (2.51)	-97.59** (1.97)	9.80 (1.36)	-.50 (1.31)		.53
RURAL COUNTIES												
USERS/ ELIGIBLES	-.12 (0.43)	-.23 (1.25)	.12 (1.90)	-.02 (0.38)	.01 (0.26)	.19 (3.50)	-.80 (1.80)	.41 (2.13)	.29 (2.17)	-.04 (2.21)		.22
SERVICES/ ELIGIBLES	-1.30 (0.77)	-2.22 (1.99)	.61 (1.54)	-.20 (0.56)	.15 (0.65)	.83 (3.08)	-6.97 (2.58)	3.17 (2.73)	2.19 (2.68)	-.33 (2.86)		.20
COSTS/ ELIGIBLES	-53.55 (1.20)	-25.12 (0.84)	3.11 (0.29)	1.75 (0.18)	-2.70 (0.44)	41.45 (4.80)	-95.81 (1.33)	83.40 (2.69)	46.78 (2.14)	-6.67 (2.20)		.35

NOTE: The first term on each line is the coefficient for each regressor. T-values are in parentheses; one asterisk indicates the variable is significant at the .05 level; two asterisks indicates the variable is significant at the .01 level.

TABLE VII
REGRESSION RESULTS - PRESCRIPTION DRUGS
ALL COUNTIES

	CONSTANT	POV	SJ	MALES-II	FEM-I	FEM-II	BLACK	SPAN	GP	DOCS	DOCS ²	URBAN	$\bar{R}^2$
USERS/ ELIGIBLES	.23 (1.49)	-.15** (2.32)	.08 (1.84)	-.07** (2.46)	.03 (1.17)	.22** (9.84)	.14 (1.32)	.02 (0.19)	.17 (1.11)	.02 (1.34)	-.0006 (1.57)	-.07** (2.65)	.58
SERVICES/ ELIGIBLES	1.27 (0.52)	1.40 (1.36)	1.36* (2.03)	.25 (0.55)	.09 (0.25)	5.04** (14.36)	3.77** (2.34)	1.30 (0.76)	-1.74 (0.73)	.04 (0.17)	-.0004 (0.65)	-.46 (1.18)	.69
SERVICES/ USERS	7.26* (2.28)	.20 (0.15)	1.22 (1.39)	1.75** (2.97)	-.05 (0.12)	5.10** (11.07)	3.60 (1.70)	1.45 (0.64)	-3.82 (1.21)	-.31 (1.08)	-.0004 (0.54)	.68 (1.34)	.56
COSTS/ ELIGIBLES	5.80 (0.59)	5.07 (1.21)	4.77 (1.76)	2.78 (1.54)	.40 (0.28)	21.23** (14.95)	14.12* (2.16)	8.29 (1.20)	-6.87 (0.71)	-.20 (0.23)	-.0005 (0.21)	-.78 (0.50)	.70
COSTS/ USERS	33.18* (2.26)	.23 (0.04)	4.52 (1.11)	11.18** (4.11)	-.008 (0.004)	22.49** (10.57)	11.56 (1.18)	8.67 (0.84)	-17.14 (1.18)	-2.10 (1.59)	.04 (1.12)	4.70* (2.01)	.53
URBAN COUNTIES													
USERS/ ELIGIBLES	-.39 (1.28)	.24* (2.16)		-.12** (3.90)	-.01 (0.58)	.18 (7.06)	-.03 (0.24)	.19 (0.83)	1.09** (2.50)	.05** (2.73)	-.001* (2.27)		.66
SERVICES/ ELIGIBLES	-5.11 (1.29)	1.43 (0.98)		.21 (0.54)	-.005 (0.01)	4.43** (13.16)	2.22 (1.49)	-1.42 (0.49)	10.78* (1.98)	.40 (1.61)	-.01 (1.41)		.79
SERVICES/ USERS	7.69 (1.01)	-.84 (0.30)		2.34** (3.14)	.07 (0.11)	4.78** (7.37)	4.01 (1.40)	1.03 (0.18)	2.89 (0.26)	-.41 (0.86)	.009 (0.68)		.50
COSTS/ ELIGIBLES	-7.26 (0.45)	1.38 (0.23)		3.24* (2.07)	-.26 (0.19)	19.08** (13.98)	8.54 (1.42)	-7.11 (0.60)	25.20 (1.10)	-1.10 (1.09)	-.03 (1.09)		.79
COSTS/ USERS	58.88 (1.60)	-10.68 (0.79)		14.85** (4.13)	.81 (0.26)	21.58** (6.89)	16.13 (1.16)	2.26 (0.08)	-21.11 (0.40)	-3.15 (1.36)	.07 (1.04)		.47
RURAL COUNTIES													
USERS/ ELIGIBLES	-.25 (0.65)	.44** (2.94)	.02 (0.31)	.01 (0.20)	.06 (1.84)	.26** (7.57)	.28 (0.73)	.08 (0.54)	-.08 (0.31)	.08 (1.30)	-.004 (1.41)		.58
SERVICES/ ELIGIBLES	-5.81 (0.92)	10.28** (4.27)	-.31 (0.35)	.36 (0.42)	-.02 (0.03)	5.61** (10.30)	7.53 (1.23)	1.10 (0.46)	-8.40* (2.17)	.42 (0.42)	-.03 (0.58)		.74
SERVICES/ USERS	-3.39 (0.52)	9.71** (3.87)	-.82 (0.87)	.36 (0.40)	-.35 (0.63)	5.28** (9.30)	10.14 (1.59)	.95 (0.38)	-8.35* (2.07)	.40 (0.38)	-.02 (0.51)		.70
COSTS/ ELIGIBLES	-24.24 (0.92)	39.62** (3.95)	-1.64 (0.44)	2.00 (0.56)	-.18 (0.08)	23.25** (10.23)	26.27 (1.03)	8.67 (0.86)	-31.03 (1.93)	1.64 (0.39)	-.11 (0.56)		.73
COSTS/ USERS	-14.80 (0.51)	38.62** (3.49)	-3.63 (0.88)	2.71 (0.69)	-1.41 (0.58)	22.75** (9.10)	34.17 (1.21)	8.37 (0.76)	-31.26 (1.76)	1.29 (0.28)	-.09 (0.43)		.68

NOTE: The first term on each line is the coefficient for each regressor. T-values are in parentheses; one asterisk indicates the variable is significant at the .05 level; two asterisks indicates the variable is significant at the .01 level.

TABLE VIII
REGRESSION RESULTS - HOSPITAL OUTPATIENT CARE
ALL COUNTIES

	CONSTANT	POV	SJ	MALES-II	FEM-I	FEM-II	BLACK	SPAN	HDOCS	GP	DOCS	DOCS ²	URBAN	R ²
USERS/ ELIGIBLES	.60** (4.78)	.21** (3.91)	-.04 (1.15)	-.06** (2.69)	-.05** (2.59)	.08** (4.63)	.09 (1.04)	-.11 (1.18)	-.22 (1.85)	-.30** (2.38)	-.05** (4.80)	.002** (4.65)	.03	.45
SERVICES/ ELIGIBLES	1.53** (4.18)	.79** (5.06)	-.10 (0.86)	-.13* (1.96)	-.12** (2.31)	.41** (7.80)	.23 (0.92)	-.44 (1.72)	-.45 (1.32)	-.122** (3.34)	-.17** (5.27)	.005** (5.10)	.12* (1.98)	.61
SERVICES/ USERS	4.17** (3.21)	.47 (0.85)	-.17 (0.44)	.21 (0.87)	-.06 (0.33)	.75* (4.00)	-.008 (0.01)	-.16 (1.25)	1.37 (1.12)	-.270* (2.09)	-.25* (2.11)	.006 (1.70)	.25 (1.20)	.19
COSTS/ ELIGIBLES	19.23* (1.99)	15.14** (3.69)	2.23 (0.76)	-1.68 (0.94)	-1.54 (1.12)	10.03** (7.21)	5.94 (0.90)	-5.06 (0.73)	-5.84 (0.64)	-18.01* (1.98)	-2.49** (2.85)	.07** (2.62)	3.29* (2.09)	.49
COST/ USERS	38.15 (1.40)	3.57 (0.31)	12.13 (1.46)	3.57 (0.70)	.92 (0.24)	20.34** (5.16)	9.80 (0.53)	-21.76 (1.11)	46.33 (1.80)	-31.20 (1.15)	.16 (0.07)	-.04 (0.57)	5.76 (1.29)	.26
URBAN COUNTIES														
USERS/ ELIGIBLES	.93** (3.50)	.21** (2.34)		.07** (2.89)	-.04* (2.15)	.07** (4.15)	.03 (0.29)	.07 (0.32)	-.79** (4.06)	-.73** (1.99)	-.07** (4.15)	.002** (4.40)		.61
SERVICES/ ELIGIBLES	1.26 (1.30)	1.25** (3.74)		-.20* (2.30)	-.14 (1.89)	.39** (5.06)	.05 (0.14)	-.13 (0.17)	-1.29 (1.80)	-.33 (0.25)	-.21** (3.38)	.007** (3.67)		.63
SERVICES/ USERS	1.15 (0.28)	1.84 (1.31)		.01 (0.04)	-.13 (0.41)	.56 (1.75)	.07 (0.05)	-1.54 (0.49)	4.04 (1.35)	3.39 (0.60)	-.26 (0.98)	.007 (0.79)		.04
COSTS/ ELIGIBLES	26.13 (1.07)	18.26* (2.18)		-2.27 (1.02)	-1.14 (0.59)	10.89** (5.66)	-1.37 (0.16)	13.14 (0.70)	-18.45 (1.03)	-31.27 (0.93)	-2.38 (1.49)	.07 (1.51)		.53
COSTS/ USERS	11.53 (0.19)	20.49 (0.95)		3.06 (0.54)	3.38 (0.69)	19.57** (3.98)	1.43 (0.07)	-45.92 (0.95)	83.83 (1.82)	10.02 (0.12)	.74 (0.18)	-.07 (0.56)		.17
RURAL COUNTIES														
USERS/ ELIGIBLES	.97** (2.85)	.03 (0.18)	-.02 (0.32)	-.02 (0.48)	-.04 (1.54)	.10** (3.39)	.007 (0.02)	-.09 (0.66)	-.06 (0.30)	-.25 (1.08)	-.11 (1.85)	.004 (1.51)		.27
SERVICES/ ELIGIBLES	1.72** (2.15)	.18 (0.51)	-.04 (0.28)	.02 (0.26)	-.09 (1.73)	.45** (6.50)	.37 (0.47)	-.19 (0.57)	-.15 (0.30)	-.80 (1.48)	-.13 (1.47)	.006 (1.03)		.50
SERVICES/ USERS	2.30 (1.08)	.19 (0.20)	-.23 (0.60)	.38 (1.32)	.006 (0.03)	.94** (5.14)	2.11 (1.01)	-.62 (0.74)	.79 (0.58)	-1.64 (1.14)	-.04 (0.11)	.001 (0.03)		.31
COSTS/ ELIGIBLES	31.66 (1.36)	-6.28 (0.60)	6.18 (1.44)	.99 (0.31)	-1.57 (0.81)	9.57** (4.76)	7.61 (0.33)	.67 (0.07)	-10.49 (0.70)	.29 (0.02)	-3.12 (0.80)	.12 (0.66)		.32
COSTS/ USERS	53.05 (0.07)	-29.97 (0.87)	17.27 (1.23)	4.07 (0.39)	-1.33 (0.21)	22.10** (3.36)	62.54 (0.83)	-15.83 (0.53)	20.31 (0.42)	14.96 (0.29)	-2.63 (0.20)	.21 (0.35)		.19

NOTE: The first term on each line is the coefficient for each regressor. T-values are in parentheses; one asterisk indicates the variable is significant at the .05 level; two asterisks indicates the variable is significant at the .01 level.

V. Summary and Conclusions

This study has attempted to analyze various factors affecting Medicaid utilization patterns. Particular emphasis in this paper has been placed on the impact of physician geographic and specialty distribution on utilization rates and on the effect of a prepayment/peer review approach to utilization and cost control. Despite the widespread dissatisfaction with Medicaid and the general agreement on the need for radical change in the financing of health services, it is valuable to study what has taken place under that program. One must readily acknowledge, however, that it is difficult to make policy recommendations on the basis of evidence from a single state. Findings based on research performed in one part of the nation can be too easily influenced by considerations peculiar to that area. For example, two factors which were held constant in the analysis of variations in utilization within California were the physician and hospital reimbursement procedures and the administrative structure of the state. Because these and other factors vary among states, one must hesitate in drawing firm, general conclusions. It is in that spirit that these concluding remarks are made.

The first general conclusion is that policies which would increase the supply of physicians will have different kinds of effects in urban and rural areas. In urban counties the use of many services increases as physician supply increases, while in rural counties the primary impact appears to be on patient loads of physicians and perhaps on travel time of patients. In urban counties, there was little evidence that increases in the supply of physicians would increase the access to care, as measured by the percentage of the eligible population seeing physicians. More Medicaid eligible

patients see private physicians, and fewer use hospital outpatient services which may mean higher quality and more continuous care.

Most of the remaining results on the physician supply variables support theories of physician induced demand. There were no significant effects of physician supply on the number of visits or costs per service user. However, there are marked increases in hospital admission rates, laboratory, x-ray, and other diagnostic services, surgical procedures, and prescription drugs. The increases in costs per eligible person, which according to our estimates would occur with different increases in physician supply, are displayed in Table IX.

Table IX
Physician Availability and Costs Per Eligible Person
Urban Counties

Physicians Per 10,000 Persons	Hospital Inpatient Care	Physician Visits	Laboratory, X-ray, & Other Diagnostic Procedures	Prescrip- tion Drugs	Hospital Outpatient Care	Total
9	\$102.75	\$44.83	\$ 4.48	\$13.42	\$18.54	\$184.02
11	120.02	46.03	7.48	15.23	17.14	205.90
13	133.93	46.43	9.88	16.00	16.30	222.54
15	144.31	46.03	11.64	16.53	16.02	234.53
17	151.19	44.83	13.76	16.81	16.30	242.89

Surgeon
Population

Surgery

3	\$23.21
4	30.51
5	34.51
6	38.51
7	42.40

As discussed in earlier sections, it is difficult to determine whether utilization increases reflect partial elimination of some previous level of excess demand or physician induced shifts in demand. However, in each of the services for which we observed significant increases in utilization, the physician is an extremely critical factor in patient decisions.

For increases from 11 non-federal active office-based physicians per 10,000 persons (slightly over the national average) to 15 such physicians per 10,000 persons, we observed increases of 20 percent in hospital in-patient care costs, 56 percent in outlays per eligible person for laboratory, x-ray, and other diagnostic procedures, and 9 percent in costs of prescription drugs. For an increase in the surgeon population ratio from 3.0 to 5.0, we observed a 26 percent increase in outlays for surgery.

It is impossible to extract from these findings implications for general health care costs of an increase in physician supply. In the period in which the data for this study was generated, Medicaid reimbursement levels for physician services were well below those operating for Medicare and private patients. Thus, it would appear that income gains from demand creation would be greater from treatment of non-Medicaid than from Medicaid patients. If so, efforts to generate demand would be greater for non-Medicaid patients than the levels we have observed in Medicaid. On the other hand, one could argue that physicians responded to Medicaid controls on their fees by added service provision in that program and that with more adequate reimbursement levels, less physician induced demand would occur. The issue is basically irresolvable here. Most likely, physician induced shifts in demands are related to physicians' desires to achieve some target income and that both fee controls and a surplus of other "competing" physicians would generate such behavior.

The value of increases in service provision is difficult to assess. Most likely, they enhance the accuracy of the diagnosis somewhat, and in some cases perhaps make a difference in the appropriateness of treatment. Evidence presented by Fuchs and Kramer⁸ and Auster, Leveson and Sarachek⁹ casts doubt on a conclusion that increased resources affect the major health status indicators. Individuals may become more knowledgeable about personal health problems, and recover from illness sooner and in less discomfort, all of which is of some individual and social value. We clearly need to know more about the health gains from an increased quantity of physicians' services. At present we do know that physicians' incomes will not suffer from an increase in physician supply. The capacity for demand generation together with significant physician control over reimbursement levels in most insurance programs means that provider incomes can be maintained in the face of a surplus of physicians.

Unlike urban counties, there was no evidence that increasing the supply of physicians in rural counties would affect the percent of eligibles seeing a private physician. This may reflect a different manner of practice in rural areas. The results suggest that when physicians are in relatively scarce supply in rural areas, patient loads may expand to ensure that all those who seek a physician receive some treatment. As the supply of physicians increases, patient loads of the existing physicians are

8. V. R. Fuchs and M. J. Kramer, "Determinants of Expenditures for Physician Services in the United States, 1948-68," National Center for Health Services Research and Development, Washington, D.C., 1972.

9. Richard Auster, Irving Leveson, and Deborah Sarachek, "The Production of Health: An Exploratory Study," Journal of Human Resources (Fall, 1969).

reduced but the total number of individuals seen does not increase. Families in rural counties may travel less often to adjacent counties for care if there exists a larger supply of physicians in their county of residence. The percentage of eligible individuals seeing physicians in rural areas is higher than in urban areas with physician availability held constant. Thus, while the percentage of eligibles seeing physicians does not increase as physician availability increases, it is constant at relatively high levels.

The result is that increasing the supply of physicians in rural areas would not have the inflationary consequences that a comparable policy would have in urban areas. While we found no evidence that more Medicaid eligibles see physicians when availability increases, it is highly likely that travel and waiting time is reduced and that care in emergency situations is more readily available. The quality of care provided may increase as the time available per patient expands. It also seems evident from the California experience that rural physicians do not respond to increases in availability by demand creation. There is no evidence of major increases in the supply of those services where physicians have significant influence over patients' decisions. Laboratory and x-ray services and prescription drug costs fall, perhaps indicating a substitution of physicians' time for use of diagnostic services and prescription drugs. More importantly, hospital admission rates and inpatient costs per eligible person fall with increases in physician availability. The latter seems to indicate that physicians have less need to rely on hospital personnel when physician supply increases.

It has been argued by several critics of the health system that too many physicians practice a narrow specialty requiring many years of education; that many if not most patient needs require practitioners with a

great deal of patient concern but with significantly less formal training than that possessed by specialists. It is further argued that services by general practitioners are often unavailable and, as a result, general level services are often provided by specialists and that such specialists tend to provide more services than general practitioners for identical health problems and to provide care in settings, i.e., hospitals, in which they have access to sophisticated equipment and manpower, but which are more expensive than alternative suitable settings.

This paper has provided evidence that in urban counties more Medicaid eligibles saw office-based physicians when the proportion of physicians who were general practitioners was high. However, the number of services and cost of care appear to decrease. While more Medicaid eligibles are seen by private physicians, it appears that they may receive less complex and less costly services. Much of this appears to be a substitution of private physician care for hospital outpatient services when general practitioners are more accessible. We found that in urban counties the increase in the proportion of physicians who are GPs would increase the percentage of eligibles using prescription drugs and the number of prescriptions per eligible person. On the other hand, we found no difference in the rate of provision of laboratory, x-ray, and other diagnostic services between general practitioners and specialists. Most importantly, we observed a large difference between general practitioners and specialists in the propensity to hospitalize. All else being equal, increases in the supply of specialists relative to general practitioners would markedly increase bed utilization.

In rural counties, the proportion of physicians who are general practitioners does not affect the number of eligibles receiving services. However,

the number of services and cost of services per patient served falls as the proportion of physicians who are general practitioners increases, suggesting fewer return visits and less costly services. In rural counties, an increase in the GP-physician ratio reduces prescription drug rates. It was argued that as the relative availability of general practitioners increases, more time is allocated to each patient resulting in fewer drug prescriptions. We also found that the rural general practitioner provided fewer laboratory, x-ray and other diagnostic services.

The net result is that as the proportion of physicians who are GPs increases there are some but not major increases in access to private physicians. However, there are definite reductions in hospitalization, more prescription drug use in rural areas where there is no change in physician contracts and fewer return visits and ancillary services in rural areas. With the exception of hospital inpatient care, there seems to be greater differences in practice patterns between general practitioners and specialists in rural areas than in urban areas. Competitive pressures may make the urban general practitioners behave more like other primary care physicians, e.g., similar rates of provision of diagnostic services.

If present trends in medical education continue, the proportion of physicians who are general practitioners will continue to decline. It seems clear that the cost of providing physicians' care will continue to increase as a result. Again, the question is whether the gains in improved health will be commensurate with the added costs.

This study was unable to find evidence that the San Joaquin Foundation had any utilization or cost reducing impact. The Foundation was prepaid by the state to deliver health services to all Medicaid eligibles in its jurisdiction. Unlike the traditional prepaid group practice, which not only faces

the incentives of budgetary limits on expenditures but also attempts to reap significant economies through substitution of ambulatory care settings for hospital inpatient services and various types of allied health professionals for more highly trained physicians, the Foundation attempts to control costs through peer review. This study casts doubt on claims that peer review programs can result in sizable fiscal savings. Peer review may be of significant value to society if it upgrades the quality of care in many localities. Assessment of changes in the quality of care, however, was beyond the scope of this study.

In this study the experience of the San Joaquin Foundation was analyzed in comparison with the claims examination and review functions performed by California Blue Shield. The purpose of this study was not to assess the relative merits of the review processes used by the two systems. Casual observation seemed to indicate that both made efforts to review carefully for excessive utilization and inappropriate care during the two year period. It is possible that research would find that peer review systems can yield significant fiscal savings when introduced in areas where fiscal intermediaries are less capable in performance of the utilization review function.

There are perhaps more fundamental reasons why no utilization or cost differences were observed. First, the original capitation rate was set at levels which provided only weak incentives to control utilization. The original capitation rates were based on the previous year utilization and cost experience. In that year all California physicians were reimbursed on a fee for service basis. The inefficiencies induced by that system are well known. Setting capitation rates on the basis of experience under an

inefficient reimbursement system is not likely to generate powerful utilization and cost-inhibiting controls. Second, the San Joaquin Foundation was not at risk for inpatient care. Health maintenance organizations have typically reaped their greatest economies through substitution of outpatient services for inpatient care. If San Joaquin had been at risk for a broader range of services, lower overall utilization rates may have in fact been observed. Third, the Foundation approach does not change the incentives facing the individual physician. Newhouse has written that efficiency-inducing incentives facing physicians in any group practice setting are weak because the actions of any individual physician will have little affect on his own welfare. All physicians acting in their own self-interest will of course have major effects on the viability of the group. The problem is more acute under the Foundation approach where the tie to the group is far more tenuous. The burdens placed on the peer review mechanism become immense because no individual physician has very strong incentives to examine and change his behavior.

Utilization or peer review, as a method of controlling unnecessary use of health services as well as a check on underutilization, can affect care delivery in three ways. First, utilization review serves a detection function. Services which exceed certain prescribed levels are subjected to review and physicians are often frequently denied payment for services deemed excessive. Second, utilization review can also have a deterrence effect if physicians alter their behavior because of awareness of prescribed standards. Deterrence would appear in lowered utilization rates but not in numbers of rejected claims. Finally, utilization review can have an inducement effect which will be utilization and cost increasing. Establishment of standards not only indicates what is prohibited but also what is

permitted. Because of the promulgation of prescribed norms of care, physicians may provide more of some types of services after introduction of utilization review than before. Some of the increase in service delivery may represent increased care quality. In other cases it may simply involve a substitution of services, i.e., laboratory or other diagnostic services, where the physician's judgment would have sufficed. In the latter situation a certain level of economic inefficiency is introduced. There are three reasons why utilization review may increase the provision of some services. First, the physician may face an audit and inquiry from the claims review board for inappropriate treatment if certain diagnostic tests are not performed in some cases or if certain services are not provided in others. Second, knowledge that prescribed standards will permit payment for certain services may induce their provision as long as reimbursement levels exceed their incremental costs. Third, the physician may provide prescribed services to protect himself from malpractice suits.

The result is that utilization review can have noticeable detection and deterrence effects without affecting utilization or costs of care. If the inducement effects are sufficiently strong, they may overwhelm the detection and deterrence effects. The induced provision of services which would otherwise not have been provided may increase care quality but is also likely to introduce inefficiency. In either case the effect of utilization review on utilization and costs of care will be much less than one might be led to expect. The peer review system introduced in San Joaquin county to monitor Medicaid claims most likely generated all three effects, which would explain the absence of any negative effects on utilization.

Prepayment is cited by many health experts as a critical weapon in the effort to constrain health care costs. The logic of the argument is persuasive enough. However, it seems critical that the prepayment incentives affect the decision making of the individual physician far more than they do under the Foundation approach. It is probably too difficult to enforce significant controls on service provision through claims review. Peer review can at best curtail gross excesses in service delivery and, in the process, control the generation of excessive incomes. It may also increase the quality of care in some instances.

It seems unlikely based on evidence presented in this paper that the chances of major general reductions in health care costs through peer review of physician services are very great. The issue is whether the value society places on control of excessive service delivery and of incomes of abuse-prone physicians (most likely a small proportion of all physicians) and on whatever improvements in quality occur exceeds the cost of claims review. That issue clearly needs further evaluation.

Finally, we presented evidence that blacks and Spanish-surnamed families have less access to many health services than whites under the Medicaid program. Furthermore, the results indicate that residents of urban counties also appear to have more visits to both private physicians and hospital outpatient departments, more surgery and more prescription drugs than Medicaid eligibles in rural counties, holding the availability of physicians constant.

The presence of significant differentials in utilization rates, which persist despite financial coverage and independent of the supply of physicians in the county of residence, suggests that other policies would be necessary if an objective of more equal access were to be achieved. Unfortunately, it is not clear that unequal utilization does reflect unequal

access. Given identical needs, preferences for health services vs. other goods and services, and equal ability to pay (or absence of monetary barriers), utilization levels should be roughly equal, unless other barriers exist. In the Medicaid program the monetary barrier is eliminated. If unequal utilization rates reflect unequal needs or differences in preferences, there is little call for intervention of public policy. However, if differences are due to delays in appointments, long travel and waiting time, inability to find concerned physicians, discouragement due to lack of choice, etc., then there is a stronger case for public intervention.

The urban-rural and black-white access problems are somewhat different. Many of the utilization differences between urban and rural areas we observed may reflect a less service intense mode of service delivery. There is also nothing necessarily wrong with lower surgery and prescription drug rates, given present concern with possible excessive provision of both. It is thus difficult to assess whether efforts beyond increasing the supply of physicians and para-professional personnel in rural areas to levels closer to those observed in urban areas is necessary.

Differences between racial and ethnic minorities and low income whites present a somewhat different problem. This phenomenon is another facet of the problem discussed above; given a significant control over demand, physicians can maintain incomes at satisfactory levels while providing little care to clients they view as undesirable, even in areas with very high physician population ratios. If in fact the case can be made that there are inequities in access, even more direct public intervention is most likely required. Policies which have been suggested include controls on the location of physicians so that a greater percentage are forced to practice in underserved areas,

the support of publicly provided service programs such as neighborhood health centers, and increased financial support and perhaps quotas for the medical education of racial and ethnic minorities.

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